The
Electrical Review

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Institution Membership

NEXT week the half-yearly graduate examination of the Institution of Electrical Engineers will be held. It is often referred to as "the A.M.I.E.E. exam.," which it was prior to 1929 and still is in effect, as a pass is accepted as a qualification for associate membership, provided the candidate has been engaged in electrical engineering for not less than seven years, a proportion of which must have been spent in a position of responsibility.

This examination is the approved preliminary step towards becoming a chartered electrical engineer. A study of the questions set over a number of years will show that, while "cramming" might secure success in Part I, which covers English and elementary scientific theory, the mere "paper engineer" would not make much of Part II (particularly the electricity supply section), in which a wide choice of subjects is provided. One of the subjects open to selection is economics; as efficiency in the utilisation of natural resources, which implies an economic outlook, is the prime duty of the engineer, we should like to see this subject made compulsory.

We have met well-qualified electrical men who are not in any of the five technical grades of the Institution. This may be due to diffidence, inertia, or dislike of paying an annual subscription, but the reason most often given is the dread of examinations. If they are over, say, thirty years of age, this is intensified by the feeling that their "swotting-up" days are over.

We have found that would-be members of high educational attainments are in many cases ignorant of the list of exempting qualifications (obtainable from the Institution), which includes certain degrees, certificates and diplomas. Others without special academic distinctions and past their youthful prime with whom we have spoken have not realised that the Council might agree to accept, instead of an examination, a 5,000-word thesis on original research, or a critical scientific appreciation of current practice within the candidate's special sphere.

The qualifications of a graduate may be described as those of an associate member minus the requisite experience, and the qualifications of an associate (in general) as those of an associate member minus the examination or its equivalent. The deficiency in the first case time will cure. In the other, only success in the examination will normally bring promotion; yet the effort is worth making, even on the narrowest grounds, as an increasing number of public appointments are open only to corporate members, *i.e.*, full members or associate members.

Students should develop into graduates, but all do not. Often the lack of the specified five years of responsibility prevents their being transferred to the grade of associate on reaching the age of twenty-eight, and they are thus lost to the Institution. This is a pity, but it is a sacrifice entailed by the enforcement of a standard of professional attainment that is worthy of the dignity of our profession, and is the necessary corollary of the grant of a Royal Charter.

A Topic for Liverpool

WE suggest that during their stay at Liverpool next week members and friends of the I.M.E.A. should, both officially and unofficially, talk over the subject of a National Electrical Convention. For our part, we have expressed our views on many occasions, and they are well known. On a later page of this issue Mr. E. J. Jennings, of Birmingham, who has already laid the case fully before our readers, again states the desirability and practicability of proceeding with the idea, and in a way that provides a basis for general conversation preliminary to official discussion. He advocates the holding of an all-in National Convention in 1935 and once in every three years thereafter. Support from so many directions appears to be assured that we have reached a point when practically everything seems to depend upon the attitude of the I.M.E.A. This Association's convention is the largest electrical gathering of the year in Britain, and we hope that it will find it possible to give its whole-hearted support to the larger idea, at any rate for 1935—if only as an experiment. E.D.A. is now a purely electricity supply organisation, but,

supported by the other interested bodies, it should be able to plan a programme the execution of which would impress the people as no other single electrical event has ever done.

Transformer Progress

ONE of the uncovenanted benefits of the grid was the opportunity it gave to our manufacturers to obtain both experience and kudos from its construction. These opportunities they have seized with both hands, but in no field has progress been more striking than in that of transformer design, which has resulted in the production of three-phase units up to about 100,000 kVA to meet all working conditions and yet, at the same time, to be capable of relatively easy transportation. In the light of this enlargement of practice in manufacture and operation, a revision of the Standard Specification was called for, and the document now produced by the British Standards Institution (1s. 6d., post free), which deals with such matters as h.v. tests and terminal markings, as well as the performance of transformers, can be regarded almost in the light of an authoritative text-book on several aspects of its subject. The Specification is still in the draft stage, and we suggest that all whose experience is such as to enable them to offer constructive criticism should secure a copy immediately from that Institution.

Ohm's Law Again

IT seems strange to be arguing about the precise meaning of Ohm's Law more than 100 years after its enunciation, but the principle is so fundamental that we are glad to have the opportunity of giving our readers' views, having regard to recent questionings as to its validity in all circumstances. Dr. G. S. Ohm showed that the current varied directly with the e.m.f. and inversely as the resistance of a circuit. Mr. H. M. Sayers is surely somewhat arbitrary in suggesting that this does not imply constant physical conditions, and that the impedance of a neon tube is not resistance of the kind meant. Our interpretation agrees with that given in the Dictionary of Applied Physics, which is that the ratio of the e.m.f. to the current is a constant, this constant being the resistance of the circuit.

Tool Drives

THE chief difference between workshop practice of the present time and of the days when those of us who are on the top-side of forty years served our time is the prevalence of machine tools. The replacement of the screw-cutting lathe on which we threaded our nuts and bolts with the aid of gearing tables has made more difference than even the introduction of the electric motor. But the combination of the two, as a self-contained unit, is needed to make a real engineering job. This has not yet gone so far as it ought; as Mr. A. P. Young points out in an article in this issue, we have been behind several other countries in our methods of driving, but with a development of the tendency for co-operation between the electrical and machine-tool designers the complete electric tool should find a rapidly developing sphere of utility.

Next Week's Convention

THE papers to be read at the I.M.E.A. Convention, which opens at Liverpool on Monday under the presidency of Mr. P. J. Robinson, are most apt to the needs of the moment. They will deal with the power load (Messrs. H. C. Lamb and W. E. Swale), the small householder (Mr. J. W. T. Townley) and a.c. distribution systems (Mr. A. Romero). From what we know of the authors, we can take it that their papers will go right to the roots of these subjects. The week's programme includes visits to several places of technical interest, such as the British Insulated works at Prescot, the Metropolitan-Vickers works at Trafford Park, and the Automatic Electric Co., as well as the record-breaking Clarence Dock power station and the Mersey Tunnel. The annual dinner, at which the Duke of York will be present, will be held on Wednesday instead of Thursday as in previous years. On all counts the benefits to electrical development, both direct and indirect, as a result of the Convention should be appreciable.

Control and Co-ordination

AT the B.E.A.M.A. dinner last week Mr. M. J. Railing took up the theme of controlled production, of which so much has been heard in recent weeks. Referring to the "starvation" prices with which the efforts of manufacturers of the heavier electrical plant were rewarded, he said that no industry could play its full part in the national life on such terms. While the word "rings" had an ominous sound, there was no doubt that the assurance to manufacturers of adequate remuneration would spell improvement in quality and service, and would work out to the customer's advantage. Mr. Railing did not favour methods which had been adopted on the Continent for the control of industry. He wanted to see voluntary co-operation between producers such as that represented by B.E.A.M.A. Sir John Brooke also called for co-operation—this time between supply authorities and manufacturers, in order that appliances should be produced at prices which the working classes could afford. He warned both parties, however, that the lowering of prices must not be accompanied by a deterioration of quality.

Special Convention Number

The Incorporated Municipal Electrical Association is holding its Annual Convention at Liverpool next week. The June 1st issue of

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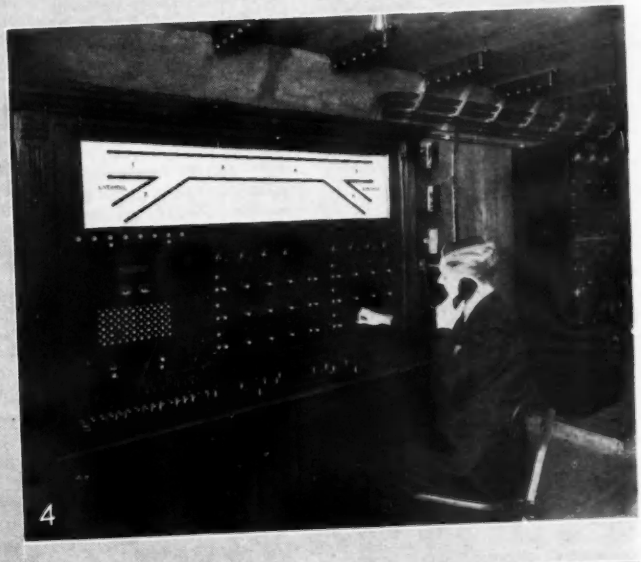
will contain a report of the proceedings, with pictures, and a number of special authoritative articles on various aspects of the application of electricity.

Supplies in Depressed Areas

IN a daily paper appears the suggestion that the inhabitants of derelict areas should be provided with electricity free of charge or at a price below the normal. It is submitted that, in addition to giving real relief in individual cases, the scheme would furnish useful data to undertakings regarding the effect of giving supplies on a large scale. The value of such data, even for ascertaining the cost of production, would, we fear, be impaired by the lavishness with which electricity would be used, and the provision of free electricity would be useless without free appliances also. It might also be difficult to get over an accusation of "undue preference," since concessions must not be personal to the user. Nevertheless, the idea should not be dismissed out of hand as impracticable. Could not the Electricity Commissioners make a "demonstration scheme" for the electrification of small property in a depressed area, as they have for rural supplies at Bedford and Norwich? It would have to be subject to suitable restrictions and safeguards to ensure that the results would be comparable with those obtainable elsewhere under normal conditions. Probably, however, the chief gain would not be the statistical data obtained—as this is to some extent available in the normal way—so much as the effect of raising the general standard of consumption.



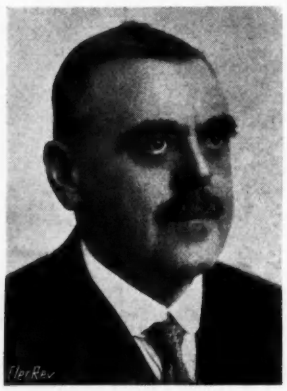
The Mersey Tunnel. **(See page 733)**

1. Lighting from recessed fittings in tunnel wall. 2. Lighting switchgear and cable-way in access passage. 3. Motor driving ventilating fan, showing hydraulic coupling equipment and damper gear. 4. The operator's desk and one panel in the main control room. 5. The mid-river pump room. 6. One of the fire stations.

Wiring Methods. By A. H. Dykes, M.I.E.E., M.Inst.C.E.

A consideration of some outstanding problems

FOR many years any fire the origin of which was not immediately obvious was as a matter of course attributed by the Press to "the fusing of an electric wire." Whilst this may in some cases have been justified, it is absolutely certain that in a much larger number of cases it was not; indeed in some cases where this explanation was given there was actually no electric wiring in the house, and in other cases although the wires were there they were not alive. Electric light, when properly installed, is the safest form of illumination, but like most other modern conveniences it is necessary to be sure that it is properly maintained.



Mr. A. H. Dykes is vice-chairman of the board of the National Register of Electrical Installation Contractors

There are many installations where the original work was of first-class quality and absolutely safe, but where additions have been made—frequently by decorators or small local electricians—which from a fire point of view constitute an undeniable risk. I have seen more than one installation put in over twenty years ago to which absolutely no attention has been subsequently given beyond replacing worn-out lamps. No flexible cord should be expected to last such a length of time.

The rubber covering is necessarily very thin, and with the action of light and the atmosphere it gradually hardens and cracks, with the result that sooner or later a short-circuit occurs. The fuse in that particular circuit may, if in good order, cut off the current in time; but in many cases the flexible cord flames up and may set fire to light draperies or other material near it. Every flexible cord should be renewed at least every seven years. Also, every installation of any size should be tested at least once a year, so that incipient faults can be detected and rectified.

Just as the rubber of the flexible cords becomes hard, so does the rubber on the wiring, although it takes longer. So long as it is not disturbed nothing happens, but if the ends of the wires are bent the rubber cracks and the insulation gives way. This is pretty sure to happen if any extensive scheme of redecoration is carried out, when the decorators will in all probability remove and replace switches and plug sockets, and as likely as not install additional points.

Advice and Inspection

It frequently happens that wiring put in originally for 100 or even 50 V supplied from a small private generating plant, is turned over to the public mains at 230 V. Expert advice should be obtained in all such cases to be sure that the condition of the wiring and the pattern of the fittings and accessories are such that the wiring will safely stand the increased pressure. In the old days important installations were generally carried out under the supervision of independent expert consulting engineers, or at least by well-known wiring contractors used to such work. To-day the electrical work is frequently left in the hands of an architect who is not an electrical expert, and generally relies on the wiring contractor.

It is a mistake to suppose that the owner can rely for security on the acceptance of the risk by his fire insurance company which has neither the opportunity nor the staff available for that detailed supervision necessary to ensure that the work has been properly carried out, and is quite satisfied if someone has filled in a form giving certain particulars of the installation. Electric wiring is generally so safe that in the majority of cases no claim is subsequently made on the insurance company and the rates charged for insurance are therefore sufficient to cover the risk. If the companies find that the rates are not sufficient they increase them.

The National Register

The National Register of Electrical Installation Contractors was instituted a few years ago in order to improve the standard of electrical installation work, and provide a list of reliable contractors from which those desirous of having electrical work carried out could choose a contractor. The Registration Board, which is composed of representatives of the Institution of Electrical Engineers, the Association of Consulting Engineers, the Electrical Contractors' Association, the supply authorities and others, is assisted by local advisory committees, and before any contractor is admitted to the Register stringent inquiries are made as to the quality of his work, and a number of installations carried out by him are carefully examined by the Board's inspectors.

Every certificate of registration comes up for renewal each year, reports are obtained and further inspection of work is carried out in all cases where any doubt as to the standard of recent work has arisen. In the event of minor faults being found in the work of a registered contractor he is first admonished, but in the event of a recurrence of such faults, or if the original faults are serious ones, his name is struck off the Register.

It is becoming the custom for local authorities, consulting engineers, architects and others to invite only registered contractors to tender for electrical work, knowing that if they subsequently have any complaints to make they can always lay them before the Board.

When deciding on an electrical installation a very wide field of choice is open as regards the system to be adopted. Shall the wiring be run in conduit, and if so, what kind? If a flexible surface system is required shall the wire be copper-covered or lead-covered or plain tough rubber or one of the various patent rubber compounds?

The Condensation Problem

A system which may be quite satisfactory for a small installation in a dry house may be an absolute failure in a stone building subject to large variations in temperature. Where there is no special liability to condensation, and where it is desired to conceal the wiring, a screwed steel-barrel system with suitable outlet boxes gives a most satisfactory installation and has the advantage that at any time a wire can be withdrawn and replaced without disturbing the wall or decorations.

Where there is a probability of condensation and where the building is one which, like, say, the Bank of England, is expected to last for very many years, copper or brass tubes are far superior to steel as they take up the temperature of the air much more quickly, and there is in consequence little or no condensation in the tubes, thus prolonging very greatly the life of the wires in them. There is also, of course, no rusting.

In new private houses the pipes can easily be buried in the walls or between the floors, but to install a tube system in a finished house generally means very considerable cutting away of walls, and in consequence a more flexible system run on the surface is desirable; which system to adopt in that case depends entirely on the particular circumstances encountered.

If the installation has its own supply either from private plant or a separate transformer, or if it is in an area where the Electricity Commissioners have sanctioned earthing at each consumer's premises, concentric wiring with bare outer presents many advantages as regards safety from fire and shock. The live wire being surrounded everywhere by the earthed bare outer, any leakage soon becomes a "dead short" and the current is cut off before it can possibly leak to gas mains or water pipes.

If carried out by good contractors familiar with the system, copper-covered wiring of the "Stannos" type, using the outer as the return, makes an excellent job in schools, colleges, hospitals and similar buildings, as it can be run with the minimum of cutting away and once it is up is not easily injured.

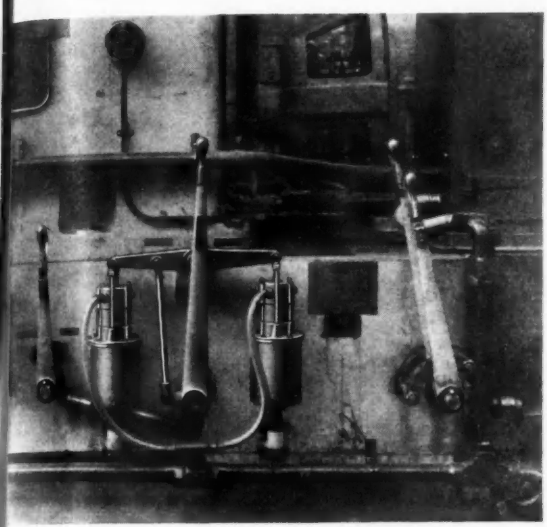
Twin lead-covered and tough-rubber-covered wires are easily run, but are more easily injured and should not be employed where they are likely to be subject to rough usage.

A Power Station at a Lignite Mine

In a recent issue of *Le Genie Civil*, M. Jacques Dumas gives some particulars of the undertaking of the Société Minière et Electrique des Landes, which holds the concession for the working of about 88 sq. miles of lignite deposits in the French Departments of Gironde and Landes. The company has commenced mining operations near Hostens, where the lignite raised is being utilised for the generation of electric power at a 25,000-kW plant which has been erected adjacent to the mines. The equipment of the station comprises three vertical-tube boilers generating steam at a pressure of 312 lb. per sq. in., and two 12,500-h.p. steam turbines and generators producing 6,000-V three-phase 60-cycle power at 3,000 r.p.m. An outdoor sub-station with two transformers steps up the voltage for transmission to a sub-station of the Midi of France Railway Co. at Pessac, near Bordeaux, a distance of about 23½ miles.

Electric Machine Tools. By A. P. Young, O.B.E.

THE next phase of electrical mechanisation in our factories must evolve from the electrically driven machine-tool unit. The bad old days of overhead shafting, with its maze of pulleys and belts, are fast disappearing—but not fast enough in this country. We have so far lagged terribly behind the United States and Germany in this respect, mainly



Hydraulic thrusters operating the feed clutches of a large turbine casing boring machine

through lack of co-operation between the machine-tool designers and those responsible for the electrical equipment.

The machine tool of the future will be a self-contained electrically driven unit complete with its control mechanism. This conception means that right from the beginning the complete design must be evolved through the co-operate efforts of the machine-tool designer and the electrical engineer. Progress in the past has been impeded through conservatism of the machine-tool industry and its reluctance to recognise this principle. Unless there is unification of effort right from the drawing-board stage, the finished mechanism will remain merely a machine tool to which has been added an electric drive. Rather the common aim must be to produce a harmonious and purposeful *electric* machine tool, in which all the essential components have been skilfully and artistically blended together to give maximum productive service.

The individual motorised machine tool possesses many advantages, which can be set down as follows:—

(1) Reduction in maintenance costs through the elimination of overhead shafting, pulleys and belts.

(2) Saving in power consumption.

(3) Improved cleanliness and tidiness of the machine shop.

(4) Better lighting, and thereby a saving in the electric light bill.

(5) Elimination of noise.

(6) Reduction in the accident risk.

(7) Extreme portability, thus making changes in the arrangement of the work flow to meet new conditions more easy and less costly.

(8) The adoption of a colour scheme is facilitated. Enlightened management is moving rapidly in this direction, because the psychological reactions produced by light and bright workshop conditions assist the worker to increase his individual productivity. In some factories the machine tools are being painted a bright grass-coloured green (very restful to the eyes) and when the overalls worn by the workpeople are of the same colour the conditions make for the highest possible efficiency.

The Electrical Equipment

Pole-change a.c. motors are being used effectively for driving lathes and drilling machines. There is no doubt that their use will be extended to other machines, as they simplify the design by eliminating the change-speed gear box. The motor control gear should be built into the machines so as to obtain centralised control of the electrical as well as the mechanical operating mechanism.

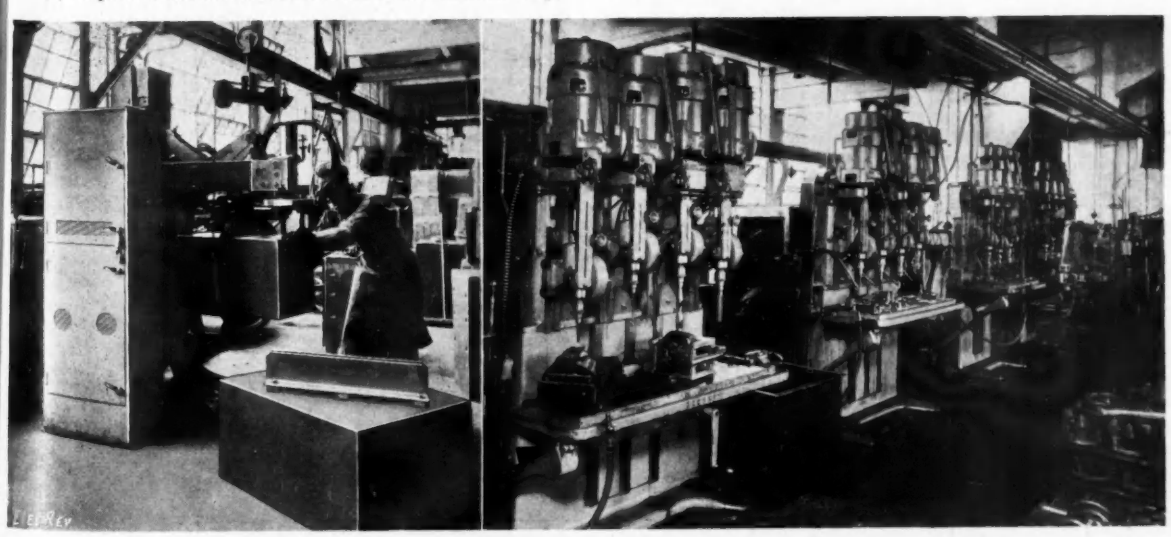
On the ideal machine, the motor shaft is the driving spindle. This ideal has been achieved on lathes, drilling machines, grinders and various types of woodworking machines by the use of rotor and stator units. By this method of drive all intermediate shafts, bearings, gears and clutches have been eliminated, thus giving an increased overall efficiency, and in many cases reducing the cost of the machine.

Mr. A. P. Young, O.B.E., M.I.E.E., M.I.A.E., is manager of the Rugby works of the British Thomson-Houston Co., Ltd.

In the future development of machine tools, rotor and stator units will no doubt be used extensively, for they can be so readily incorporated in the machine. They will also be used for driving quick traverses and auxiliary motions which have hitherto required considerabde mechanism to operate them.

High-speed drilling machines and woodworking machines often require speeds which cannot be obtained by a 50-cycle supply, except by gears or pulleys. Frequency changers can, therefore, be used to obtain the high speeds direct, and this is a great advantage on portable tools.

The electrical hydraulic thruster is in principle a motor-driven centrifugal impeller, which pumps oil from the top of the piston to the underside. As the piston rises it lifts the rods which are attached to it. The bottom clevis is anchored to the machine, and the top clevis pushes the lever of the apparatus to be operated by the thruster. Hydraulic thrusters



Left: Spot-welding equipment with thyratron control. Right: Motorised Herbert drilling machines

and all the psychological advantages which can come therefrom.

can be designed to give a thrust of one ton with a stroke of 12 in., and are very quick acting; a load of 70 lb. can be applied through a distance of 2 in. in ½ sec., and the cost of energy is negligible. They will be used extensively in the

A motorised Asquith radial drill

near future, as they can readily be employed for operating brakes, clutches, clamps, gear-changing mechanism, steam valves, furnace doors, &c., by remote push-button control.

The typical example illustrated of hydraulic thrusters operating the feed clutches of a large turbine casing boring machine installed in the B.T.H. Co.'s works at Rugby shows how the operator can be near the cutting tool, due to portable push-button stations arranged so that he can start, stop, inch, or raise the speed of the machine. In addition, other push buttons are provided to operate the thrusters, which in turn engage the feed required. This not only saves considerable time, but it enables the operator to control every operation of the machine wherever he may be, even if he is inside the turbine casing.

The practical applications of thyratrons are another interesting development. Take, for example, resistance welding. To obtain satisfactory welding with continuous spot or seam welders current must be supplied to the electrodes intermittently. On continuous spot welders, the time interval between the impulses of the welding current is now controlled by the welding machine itself, so that the current will be applied at the right period each time the electrodes come together. To a certain extent this also applies to seam welding. This control of current input may be effected by rotary chokes, which are detrimental to the power factor, or it can be done by making and breaking the circuit by contactors, which have a very short useful life, due to the enormous number of operations per minute.

The thyratron control unit overcomes all these difficulties as there are no moving parts. It consists essentially of two main parts, the timing circuit which controls each current impulse, and the main valves which control the welding current. The timing device for seam welders will give an impulse as short as ½ cycle—which on a 50-cycle supply equals one hundredth of a second—and the period between the welds can be regulated at intervals of ½ cycle upwards. Welding spots can be made close together or wide apart, by adjustment of the timer.

With a current duration of one hundredth of a second, the heat is so instantaneous that there is practically no discoloration of the metal. A perfect weld is made and this is a great advantage in welding such metals as stainless steel.

Just as the modern home is fitted with plugs for operating electrical domestic appliances, so will the modern workshop be fitted with plugs for operating portable electric tools such as drills, grinders, polishing mops, vacuum cleaners, sand riddles, sand throwing machines, saws, straight line and circle flame cutting machines, soldering irons, &c.

The impelling force of future development will come from the extreme ease with which electric power can be applied to the operation of tools and their various functions, and from the greater cleanliness, improved efficiency and reduction in industrial fatigue resulting from such application.

Improved Lighting in Mines

IN December, 1933, general mine lighting regulations which the Board of Trade proposes to bring into force were issued in draft form. After discussions with owners, managers, and workpeople, certain amendments were made which the Mines Department anticipated will remove all obstacles to the introduction of the regulations on September 1st. Meanwhile the revised draft (H.M. Stationery Office, 2d. net) has been formally reissued.

The new rules prescribe that in any mine, or part of a mine, in which safety lamps are used by persons wholly or mainly employed at the working face, at face rippings, or where tubs are mechanically filled, the safety lamps must be of a type approved by the Board of Trade. The light must be such that at the end of nine hours continuous burning under the standard conditions of test the mean spherical candle-power will not be less than 0.4 for cap-lamps and 0.75 for all other types of lamp, and the mean candle-power over the horizontal angle of distribution not be less than 1.5. The light must be sufficiently and suitably distributed, without giving rise to glare, and, as far as practicable, without marked contrasts of light and shade within the area of distribution.

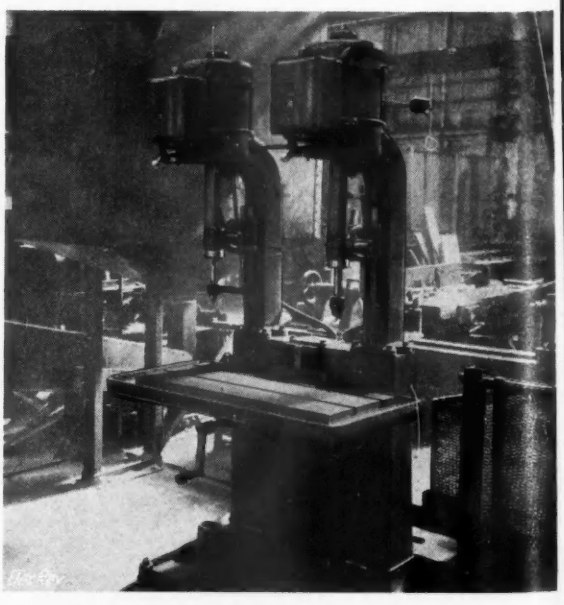
The standard conditions of test are to be determined and published by the Board of Trade.

Every bulb of a type approved by the Board of Trade must be indelibly and distinctly marked on the cap with the manufacturer's name and/or trade mark, the rated voltage and rated amperes of the type, and the outline of a crown with the letters "MDS" therein.

Subject to the provisions of the Coal Mines Act, 1911, and of the regulations made thereunder, electric lighting from a source of electric power external to the lighting unit may be used (*a*) on roads ventilated by intake air, but, except as hereinafter provided, not within 300 yards of the nearest working face; (*b*) on main return airways within 300 yards of the upcast shaft if that shaft is regularly used for the purpose of winding persons or minerals, but, except as hereinafter provided, not within 300 yards of the nearest working face; (*c*) on roads ventilated by intake air except within 50 yards, and on other roads except within 100 yards, of the nearest working face (i) in any ventilating district in which electric power is lawfully in use at the working face. Notice of the introduction of electric lighting under this provision must be sent forthwith to the inspector of the division; and (ii) in any other ventilating district only with the permission in writing of the inspector of the division; (*d*) in any other place in the mine in which its use may be permitted by special regulation.

The pressure of the system must not exceed 125 V; if the system is polyphase the neutral point must be earthed, and if the system is of any other kind the mid-voltage point must be earthed; provided that these requirements shall not apply to d.c. lighting in any mine in which such lighting is installed at the date of the regulations except in so far as the lighting extends to a place which is not covered by paragraphs (*a*) or (*b*).

The lamp bulb must be hermetically sealed and totally enclosed in a substantial protective fitting. All apparatus installed



An Archdale sensitive drilling machine installed at the B.T.-H. works, Rugby

or used for lighting must be of a type approved by the Board of Trade, except in any place which is covered by paragraphs (*a*) or (*b*) and to which No. 132 of the General Regulations dated July 10th, 1913, does not apply.

THERE will be ample opportunities for I.M.E.A. members to visit the new Mersey Tunnel (for vehicular traffic) which is to be opened by H.M. the King in July, and they should be careful not to miss the opportunity, for the scheme is of great electrical interest and embraces much that is novel. Further, the Association's president, Mr. P. J. Robinson, has acted as consulting engineer on electrical matters to Sir Basil Mott, C.B., the engineer responsible for the work.

The tunnel not only forms a link between Liverpool and Birkenhead, but also with the general highway systems at present severed by the Mersey. There is a main tunnel 2.13 miles long providing for four lines of traffic abreast from Old Haymarket, Liverpool, to Market Place South, Birkenhead, and at either end there is a branch two-traffic line tunnel, from New Quay, in Liverpool, and Rendel Street, in Birkenhead. The total length of underground roadway is 2.87 miles, and the maximum gradient is 1 in 20.

Ventilation, of extreme importance because of the motor traffic, is provided by six installations, three on each side of the river, each housed in a separate large building on the surface and connected with the tunnel by vertical shafts and horizontal underground air ducts. The upward semi-transverse ventilation system provides for fresh air blown through a main duct under the roadway, and out *via* a continuous slot under the curb on each side, and for the exhaustion of vitiated air longitudinally through the tunnel and out through openings in the roof at the ventilating stations. Each of the stations deals with a definite section of the tunnel, and each building has three storeys, accommodating blowing fans, exhaust fans, and switchgear respectively.

The Ventilation Fans

There are thirty fans in all, varying in capacity from 92,000 to 641,000 cu. ft. per minute. The impeller of the largest fan is 28 ft. in diameter. The fans in two stations at Birkenhead and one at Liverpool were supplied by the Sturtevant Co., and the others by Walker Bros. (Wigan), Ltd. Each fan is driven by a dual-winding 400-V Met.-Vick. s.c. motor. The high-speed ratings vary from 430 h.p. at 735 r.p.m. to 30 h.p. at 720 r.p.m., and the low-speed ratings vary from 139 h.p. at 485 r.p.m. to 4 h.p. at 365 r.p.m. Speed variation is also provided for by hydraulic couplings which not only afford wide fan-speed limits but also permit the motors to be started on no-load. The rate of flow of oil through the coupling is governed by a small motor.

All the motors are remotely push-button controlled from the central control room at George's Dock (Liverpool) *via* contactor cubicle starters in the respective ventilation stations. Electricity is received at 6 kV at two of the Liverpool ventilation buildings from the Liverpool Corporation system, and at 6.6 kV at two of the Birkenhead stations from the Birkenhead Corporation system, the third station on each side of the river receiving a 400-V supply from one of the other stations on the same side.

Metropolitan-Vickers "Type K." h.p. switchgear is employed for the incoming supplies and also for the respective transformers for the fan motors, pumps, and lighting. The fan motors are supplied directly from their transformers, except for the contactor gear. The fan-motor circuit-breakers are motor operated. For the l.p. circuits Met.-Vick. s.f. metal-clad switchgear is employed. There is a total transformer capacity of 4,850 kVA for the fan motors, two 150-kVA transformers for the pump motors, and eight 60-kVA equipments for lighting and auxiliaries. All the transformers are self-cooled and have 2½ per cent. and 5 per cent. tappings. Serving each Sturtevant fresh-air fan and exhaust chamber there is a multiple-blade swivel damper driven through gearing by a small motor, and the dampers are fitted with Igranic limit switches. Isolation of the Walker fans is effected by sliding motor-driven dampers at the fan inlets. The fan bearings are protected by safety thermostats made by the British Thermostat Co., Ltd.

Visibility apparatus specially designed for the scheme by Radiovisor Parent, Ltd., is installed at a point in each ventilating shaft, where a stream of tunnel air is continuously drawn by exhausting fans into a tubular metal chamber, completely shut off from all daylight. In the chamber there are a lamp and a light-sensitive cell which is connected to appropriate valve circuits. The effects of smoke and fog on the tunnel visibility are in this way indicated on a local instrument and also in the central control room, where a continuous record is kept by an Evershed & Vignoles recorder, which thus forms one guide to the attendant as to the number of fans required to be running at one time and their speeds. Another guide is the carbon-monoxide content of the atmosphere, which is measured and recorded by apparatus installed by the Cambridge Instrument Co., Ltd.

Lighting and Signalling

At about 20 ft. spacing on each side of the tunnel there are special recessed lighting fittings supplied by the Edison Swan Electric Co., Ltd. They have hammered-pattern protecting glass to soften shadows, and the cast-iron body has stainless-steel fittings and houses a 150-W lamp, and a vitreous enamelled reflector. Each complete fitting weighs 100 lb. Alternate fittings are fed from alternate circuits, and, in addition, every tenth fitting on the Liverpool side of mid-river is fed from a further independent supply from Birkenhead, and every tenth fitting on the other side of mid-river is supplied from Liverpool. The main lighting is controlled from twelve switchboards, incorporating "Viking" switch-fuses, supplied by Berry's Electric (1928), Ltd.

At regular intervals of 150 ft. spacing, staggered on each side of the tunnel, fire stations are placed, each containing extinguishing equipment and a telephone. In the event of a fire the fire alarm is used to notify the control room and also automatically to put into operation traffic signals at convenient points. Signs are also placed above these stations so that, should traffic be brought to a standstill, drivers of cars will be told to stop their engines and thus avoid emitting harmful gases. Further, at each junction chamber, traffic is controlled by "Electromatic" signals. The telephone and signalling equipment was supplied by the Automatic Electric Co., Ltd.

The pumps referred to are Drysdale "Centrex" equipments driven by vertical motors supplied by the English Electric Co., Ltd., the motors being controlled automatically by float-operated switchgear and Brookhirst contactor equipment. There are seven pumping stations—four at the portals and three within the tunnel proper, each with its collection sump for drainage or washing-down water.

Recording the Traffic

Each vehicle which passes intercepts a light beam, causing a small local relay to close, and, in turn, operate a counting mechanism in the control room. For single traffic lines the counting impulses are transmitted directly to the control room, but for double lines in one direction they are added together by Metropolitan-Vickers summating apparatus, mounted side by side with Radiovisor relay circuit boxes in the walls of the tunnel. In the control room are also mounted summators of the same make on which are finally registered the total "in" and "out" traffic at the ends of the tunnel. At each entrance to the tunnel a sharply defined beam of light is projected horizontally across the roadway on to a receiver containing a light-sensitive cell. As each vehicle approaches the toll kiosk it passes under this beam, and if it is loaded up to toc great a

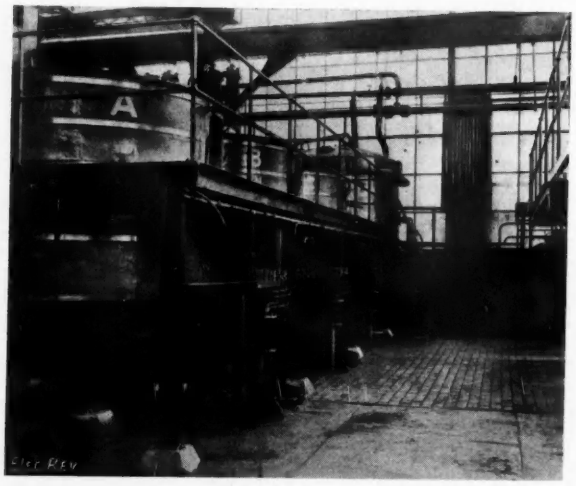
height it intercepts the beam, and the necessary signal is thus given in the kiosk.

In the control room there are two boards for the ventilation buildings on either side of the river, each incorporating a mimic diagram with coloured lamps for indicating the state of the h.p. circuit-breakers; a recorder board equipped with "Electroflo" instruments for giving indications relating to the pumping equipment; and a telephone and a fire-alarm board. All the control equipment was supplied by the Automatic Electric Co., Ltd. At the entrances and certain points within the tunnel there are large neon "Stop" signs, each with two sets of tubes fed from alternate electricity sources—Liverpool and Birkenhead. About 600 miles of insulated cable has been installed in the tunnel, "Merseylite" cable produced by Mersey Cable Works, Ltd., being adopted because of its toughness and flexibility. Time switches employed for the installation were supplied by Venner Time Switches, Ltd.

We are indebted to Mr. B. H. Colquhoun, B.Sc., the resident engineer, for permission to visit the tunnel and to collect the foregoing information.

Cable Manufacture at Prescot

ONE of the events of I.M.E.A. Convention Week will be a visit on May 30th to the Prescot works of British Insulated Cables, Ltd., where about 5,000 employés are engaged mainly in the manufacture of paper-insulated and lead-sheathed cables. Other products of these works include welders, cotton-covered wires, "Rockbestos" and "P.B.J."



Drying and compounding plant for oil-filled cables

grade aerial cables for low-voltage distribution, bare copper and s.c.a. conductors for power lines, trolley wires, busbars and commutator bars. Dry-core telephone cables are also manufactured here, the most notable example being the trunk cable recently laid between Leeds and Derby, claimed to be the largest in this country. The manufacture of silk-insulated wires, telephone cords, rubber cables and condensers is carried out in the Helsby shops. A third works at Huyton Quarries has enamelled wire as its chief product.

Delegates will have an opportunity of seeing the copper refinery where Rhodesian blister pig is cast into commercial forms with a purity of between 99.3 and 99.5 per cent. A description of this plant and the processes involved appeared in our issue of June 9th, 1933. A new furnace, with silica-brick bottom and water-cooled walls, is now under construction.

Equally striking in its way is the modern high-speed rolling mill, with two initial reheating furnaces and automatic repeaters and winders, by which bars of high-conductivity copper, heated to a bright red, are rolled in one operation to ¼-in. diameter rod. The main 2,150-V motor for the No. 3 eleven-stand mill is 1,224 h.p. Interstage reheating is not practised.

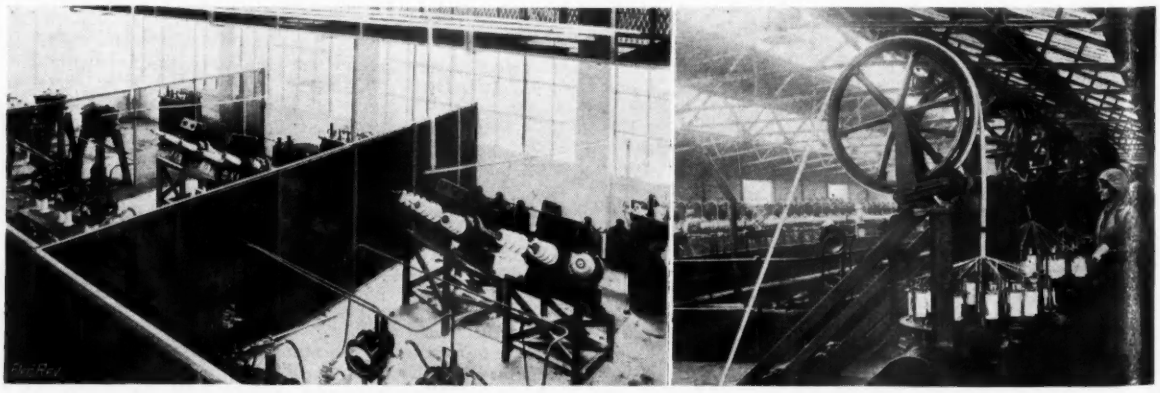
After being rolled this rod is taken by an underground carrier to the pickling tanks where the black scale is removed and the copper in solution is recovered electro-chemically. The diameter is then reduced in the heavy wire-drawing shop in high-speed automatic tandem machines with tungsten-carbide dies, the wire being mechanically handled throughout. The reduction may be from 0.25 in. to 0.048 in., but the most usual size is about 0.064 in., which can be further drawn in a separate shop to 0.002 in. for flexibles, by means of diamond dies and finished by diamond polishers running at 6,000 r.p.m. Special sections and strips are drawn on single blocks.

Bright annealing takes place in furnaces from which air is excluded by the maintenance of a slight head of steam and by the use of water seals at the ingress and egress, thus preventing discoloration of the copper. Automatic winders coil the annealed wire on spools for mounting in the cages of the stranding machines, joints being made electrically by B.I. butt welders. The cages revolving in different directions give a reversal of lay in each successive layer of the stranded conductor. "Pre-spiralling," by which the conductor is formed in one operation before shaping, ensures that both conductor and insulation are free from twist stresses when the cores are laid up in the cable.

The insulation is applied as dry paper tape until the requisite thickness has been built up, after the cores have been laid up together. Cables for pressures above 650 V receive an overall belt of paper, and some h.v. cables also receive a screening tape of copper or metallised paper. Impregnation is completed after the insulation has been dried under vacuum by flooding the cable with oil under pressure. In the impregnating plant for 23-, 33-, and 66-kV cables, provision is made for removing all gas from the oil. The cable is next passed through a press and a lead sheath is extruded round it.

Routine tests are made for copper resistance (to check areas of conductors and the length of the cable within a tolerance of 2 per cent.), insulation resistance, and capacity. A fifteen-minute pressure test is then applied. Cables for 33 kV and above are tested for power factor by a Schering bridge. If called for the cable is placed in a tank for upwards of twenty-four hours before testing, but the procedure is otherwise desirable to ensure a uniform temperature for the tests. Armouring (steel-tape or steel-wire) is applied in an adjacent shop, where a large double-wire armouring machine is worth noting.

The works are well laid out for the manufacture of h.v. oil-filled cables, the conductors of which have hollow centres, being stranded upon an open spiral of steel strip, and filled with degasified oil after lead covering. The plant resembling



Left: A bay in the Cable Research Department. Right: Maypole type braiding machines

a French cruiser in dock is the cable impregnating plant.

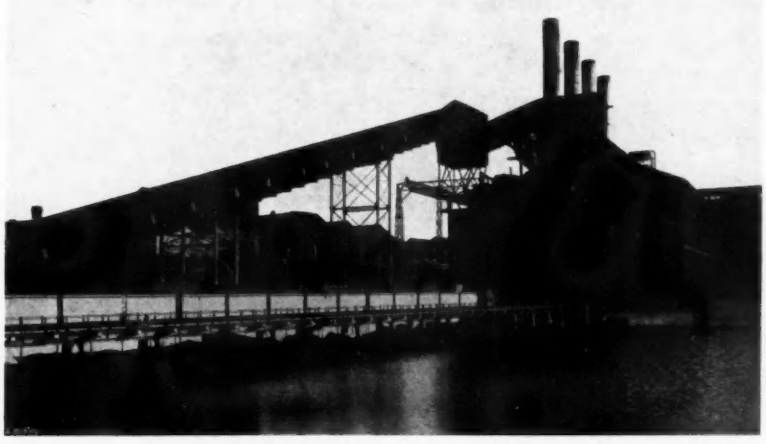
Work on super-voltage cables occupies much of the attention of the research department. Accelerated life tests on these and other cables are carried out on drum lengths of about 600 yds. at 10 per cent. above normal voltage for the equivalent of one year. The cable is so loaded as to cause the temperature to rise to 65 deg. C. (in some cases up to 85 deg.) for about eighteen hours in each week, the power factor being taken before and after the heating cycle and also at the time of maximum temperature.

After giving attention to the magnetic moulders in the foundry delegates should see the electrical fittings department, a new dressing shop for which is under construction—a first step in a scheme of extension of this section. In this part of the works are produced the street pillars, network and service boxes, cut-outs, fittings for overhead traction systems and meters. The neighbouring shop contains several good examples of recently developed welders. The wired-wireless rediffusion system for broadcast programmes, developed by the company in conjunction with Capt. P. P. Eckersley, will be demonstrated by the latter at St. George's Hall, Liverpool, at 4.30 p.m. on Tuesday next.

Electricity Supply in Liverpool

THE public supply of Liverpool dates from 1883, when the Liverpool Electric Supply Co. laid down a 110-V d.c. system. The undertaking was purchased in 1896 by the Corporation, which in the following year also acquired the Liverpool United Tramways & Omnibus Co. Pumpfields and Lister Drive No. 1 generating stations were built in 1899 and 1900. The latter included a.c., 50-cycle, 6.6-kV turbo-alternators, and was later reconstructed to increase its capacity from 8,400 kW to 33,000 kW; it is now available for peak loads.

Lister Drive No. 2 was commenced in 1904 with a capacity of 20,000 kW, but was reconstructed in 1921 for 37,000 kW. Lister Drive No. 3, which was put into operation in June, 1926, was the most efficient cooling-tower station in the country. Its present capacity is 50,000 kW in two generating units. Four 60,000-lb. - per - hr. boilers are stoker fired, and three 125,000-lb. - per - hr. boilers use pulverised fuel on the unit system.



A view of the Clarence Dock power station, Liverpool

In 1929 Clarence Dock was purchased from the Mersey Docks and Harbour Board. The contractors started work on a new station there in September, 1929, and the first 50,000-kW set was ready for running within two years. The first section, the technical particulars of which were given in the ELECTRICAL REVIEW of October 30th, 1931, comprises two 50,000-kW turbo alternators and four 160,000-lb.-per-hr. boilers fitted with chain grate stokers and pulverised-fuel firing equipment, Bailey walls, economisers and air heaters.

Outstanding Efficiency

In 1932 Clarence Dock took the premier position for thermal efficiency with 24.72 per cent., but this performance was surpassed last year with 26.058 per cent. Even better figures are now being obtained due to the higher load factor under grid operation.

On the distribution side progress has been equally good, the kWh sold having increased from 844,000 in 1896 to 310 million in 1932-33. During the same period the area of supply has grown from 0.75 to 100 sq. miles, much of which is of a rural nature where 6,600 and 400-V overhead lines are used. Substations now number 267; these include eighteen for conversion to d.c. chiefly for traction, as the policy is to change over the existing d.c. network for general supplies to a.c. with the utmost expedition.

The undertaking has about 110,000 consumers. The tariffs for domestic consumers (and especially those for smaller residences) are certainly among the most attractive in the country. The effect of these together with the up-to-date show rooms, assisted wiring scheme, and hiring schemes for water heaters, cookers, radiators and wash-boilers, is that the present sales for domestic purposes amount to 80 million kWh.

For the management of this undertaking, and for the design of Clarence Dock station also, Mr. Percival James Robinson, M.I.E.E., M.I.Mech.E., this year's President of the I.M.E.A., is responsible as city electrical engineer. He is also the lighting engineer for the city, the area of which is 44 sq. miles, and includes 900 miles of lighted streets.

We published an account of Mr. Robinson's professional career in our issue of June 16th, 1933. He was born in 1879 at Erith, Kent, was apprenticed to Johnson & Phillips, Ltd., and studied at Finsbury Technical College (under Professor Silvanus Thompson), where he gained the City of London Guild's diploma for electrical and mechanical engineering and chemistry. After a period with the British Insulated Company he was engineer and manager of the Garston and District Electrical Supply Co. until it was taken over by the Corporation in 1902. He became "chief" at Liverpool in 1928.

Mr. Robinson is a member of the National and North-West England Consultative Committees of the C.E.B. Other distinctions include the honorary degree of Master of Engineering conferred by the University of Liverpool last July and honorary life membership of the Society of Civil Engineers of France.

The Convention Programme

WE give below the principal events included in the programme of the I.M.E.A. Convention at Liverpool next week:—

The president's reception will be held at the Adelphi Hotel in the evening of Monday next. On Tuesday a civic welcome will precede the presidential address, followed by the official opening of the electrical exhibition at St. George's Hall by the Lord Mayor (Coun. G. A. Strong, J.P.). In the afternoon a paper on "Developing the Power Load," by Mr. H. C. Lamb, city electrical engineer of Manchester, and Mr. W. E. Swale, will be read and discussed, and in the evening there will be a reception by the Lord Mayor and Lady Mayoress at the Town Hall.

On Wednesday a paper on "Modern Practice in the Layout of A.C. Distribution Systems," by Mr. L. Romero, city electrical engineer of Salford, is to be read. After the luncheon of the Electrical Association for Women there will be an afternoon visit. The Duke of York and the Earl of Derby will attend the evening reception and annual dinner at the Adelphi Hotel.

On Thursday a paper on "Electricity Supply to the Small Householder" will be read by Mr. J. W. J. Townley, borough electrical engineer of West Ham. There will be an afternoon visit and in the evening the Lord Mayor and members of the City Corporation will entertain the delegates to a dance on board the White Star liner *Georgic*.

On Friday the annual general business meeting will be held in the morning and a circular tour of North Wales will commence in the afternoon.

Arrangements are being made for delegates to visit the new Mersey Tunnel and all papers are to be read in St. George's Hall, where the exhibition will remain open until Saturday.

What to See at The I.M.E.A. Exhibition

THIS year there is again an increase in the number of manufacturers displaying various products at the exhibition organised and held by the British Electrical Development Association in connection with the I.M.E.A. Convention, the total number of standholders at St. George's Hall, Liverpool, being fifty-nine. Obviously the progressive interest and value of the exhibition during past years is being continued as usual, the show is definitely mainly a domestic one, and there are more new and improved things displayed than we expected to see.

This is rather surprising in view of the nearness of the exhibition to the British Industries Fair, and it cannot be wholly explained by the fact that some of the I.M.E.A. exhibitors did not show at Castle Bromwich in February.

The importance of the exhibition is increased considerably by the fact that the public are admitted, and in this connection the location of the show this year—Liverpool—gives the whole thing a fillip. The opportunities that the exhibition affords for manufacturers and supply men to get together in the right atmosphere is also, of course, of much importance, and during the "private views" on Tuesday and Wednesday afternoons many seeds for future development should be planted. The efforts of the Electric Lamp Manufacturers' Association to brighten the show generally, apart from its own particular exhibit, are highly creditable.

Aidas Electric, Ltd.

The new 1½-gal. "Sadia" water heater, in common with the existing models, has a heavy gauge copper sheet inner container, all the seams of which are welded with copper. No brass is used in its construction. The base plate is a manganese-bronze hot pressing, with the element, flow and thermostat tube of copper, the whole being heavily tinned. The elements are rated at only 25 W per inch length. For a.c. a Satchwell thermostat is fitted and for d.c. a "Sadia" mercury-tube unit is employed.

The main feature of the new Aidas thermo-circulator, which is made in 3-, 5- and 12-gallon sizes, is the easy fixing arrangements. A perfect water joint is made with gaskets, and soldering of the boss is not required. There is no metal-to-metal contact between the tank and the flanges, while greater mechanical strength is obtained by the dome being gripped between the boss and the flange.

Automatic Electric Co., Ltd.

A comprehensive display of "Xcel" domestic appliances includes several cookers and utensils such as kettles, toasters, boiling plates and rings and a milk warmer.

"Cosyglo" fires are featured prominently, and there are bowl fires, panel and "Utility fires, and a 3-ft. window type tubular heater and a three-tier bank of 6-ft. tubes. Water-heating equipment includes storage tanks with immersion heaters and thermostats fitted by means of the company's flange connectors. There is also a wide selection of other domestic utility equipment, such as irons, towel rails and shaving pots.

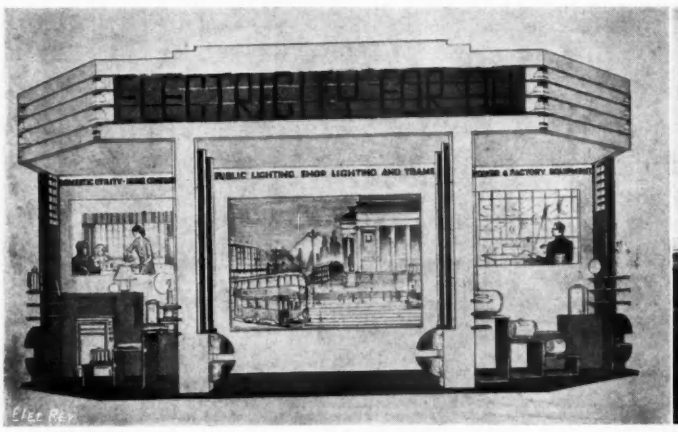
Strowger automatic telephine equipment is demonstrated by a 1,000-line exchange, while a ten-line private automatic exchange provides telephone communication for the administrative side of the exhibition. Equipment for demonstrating remote control of power networks comprises an indicating panel and control indicating equipment supervising the working of a small motor-generator and circuit-breakers. "Electro-matic" vehicle-actuated traffic signal equipment is demonstrated.

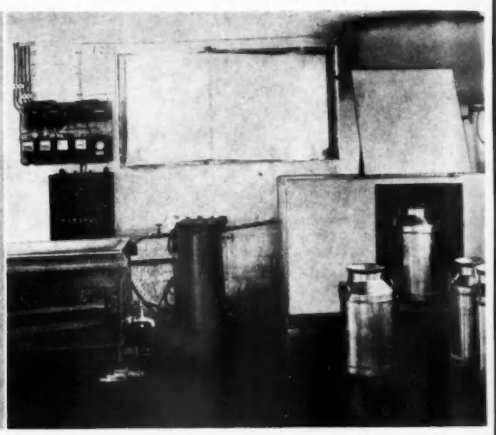
Bastian & Allen Ltd.

Demonstrations showing how quickly steam can be raised with electrode boilers will be given. With the type to be demonstrated it is possible to obtain a pressure of 15 lb. per sq. in. within one or two minutes of switching on. This is due to the fact that the current used passes through, and the heat is therefore generated in, a relatively small quantity of water. The heating effect of 20 kW is concentrated in less than ⅛ cu. ft. of water.

This speed of steam raising is particularly advantageous when it is required intermittently for short periods, as current is practically only in circuit for the periods steam is actually being taken.

A circulator suitable for heating a moderate-sized house, complete with hydraulic load control, will be exhibited, and also some interesting models of large buildings which have thermal storage equipment installed by the company, with loadings ranging from 1,500 kW to 2,000 kW.





The E.D.A. and Liverpool Corporation tableau and a new type of Bastian & Allen electrode boiler installed at Cottslowe Dairy Products, Ltd.'s, cheese factory at Aylesbury

The range of domestic water heaters is represented by a 1½-gallon heater.

Belling & Co.

The new Belling cooker with exterior oven elements is now made in three standard sizes: No. 42, with a 2,000-W boiler-griller; No. 43, with a 1,600-W boiling plate and a boiler griller; and No. 44 with a 1,000-W and a 1,600-W boiling plate and a boiler-griller. The new "Baby" cooker is for table use and measures overall 13 in. wide, 14 in. deep and 8½ in. high. It has a single-heat oven element loaded at 500 W, and a 2,000-W boiler-griller.

A wide range of fires includes several built-in models in alternative attractive colours and a special display of the new "Sol-Ray" and "Chrome-Ray" fires which are of the open-end trough reflector pattern with rod-type elements. Eleven sizes of immersion heaters are available with loadings of from 250 W to 3,000 W.

Berry's Electric, Ltd.

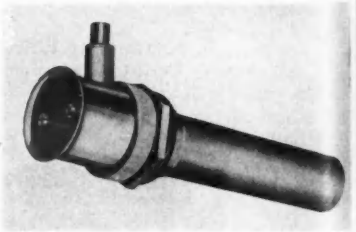
This exhibit is mainly devoted to modern heating apparatus of the inset type. Imitation-fuel fires of the open-element and reflector patterns are also exhibited, and the company is showing its latest water-heating apparatus which is of particular interest to supply companies from the hire or hire-purchase point of view. "Canvary" water heaters, which are available in 1½-, 3-, 5-, 12-, 15- and 20-gallon sizes and loaded at 500, 600, 800, 1,000, 1,500, and 2,000 W, respectively, are of the non-pressure type incorporating a mixing valve. The "Magicoal" range of fires includes the "Flectaberry," "Adjustalog," and "Beauberry" models. The last has the company's "Plus" fuel. It is loaded at 2 kW. Standard finishes are oxidised silver and copper, but art enamel is available.

Geo. Bray & Co., Ltd.

In addition to a comprehensive selection of domestic immersion heaters for fitting either to rectangular tanks or to cylinders, there is a series of new automatic immersion heaters with two and three blades mounted on a "bolt-on" flange for fitting horizontally into the sides of tanks or cylinders. The flanges are made flat for tanks and round for cylinders. There are four standard sizes (1,500, 2,000, 2,250 and 3,000 W), and the heater is complete with thermostat for a.c. up to 250 V, and has a screwed plug to take a draw-off cock.

A limited selection of the hundred or so high-speed range plates available is also shown. Strip and ring heaters include the KB half-sheathed ring elements fitted as standard to many makes of washboilers, kettles, urns, waffle irons and hair driers.

Cartridge immersion heaters are being fitted by a number of kettle makers; the maximum loading of the 4¼-in. long heater is 1,000 W. A new feature is the Bray automatic resettable cut-out fitted to the cartridge heaters. There are a few new portable radiators. Finned strip heaters can be fitted into containers for use purely as convection heaters or in conjunction with a fan, when a relatively high wattage is obtainable from a small unit.



Bray cartridge immersion heater with a resettable thermal push-bar switch

British National Electrics, Ltd.

Because in some districts the first cost of equipment is the most important consideration, this company has introduced an alternative range of cookers similar to the existing cookers, except that, instead of the elements being housed within steel tubes welded to the sides and/or tops and bottoms of the ovens,

there are elements arranged on the internal plug-in system.

In the older type cookers the tubes housing the elements for bottom heat, and in some cases for side heat, are now placed outside the cooking space. Model No. C.6 is the latest introduction of the nine cookers shown, and is suitable for from two to five persons. The oven cooking space is 12½ in. square by 14 in. deep, giving a meat capacity of 10¼ lb. The oven loading is 1,800 W, and the elements are of the internal plug-in type and housed behind swinging gates designed to promote heat circulation and to carry the runners for the grid shelves.

Breakfast cookers of four types are exhibited, including the "Salford" pattern

British National Electrics C.6 cooker

which has a 2½-kW 3-section combined griller and boiling plate, and the "Manchester" pattern breakfast cooker having an enclosed-type combined griller and boiling plate.

The "Rapid" combined boiler-griller, which has been adopted by supply undertakings for both the breakfast and full-size cookers, is believed to be the only radiant fully protected griller-boiler available, apart from low-voltage equipment.

British Sangamo Co., Ltd.

Recently developed types "S" and "W" time-switches are displayed, the former being of the usual self-starting synchronous motor-operated pattern. The type "W" time switch has a self-starting synchronous motor which winds a spring which in turn is controlled by a suitable escapement. When the spring is fully wound a friction device incorporated in the barrel comes into operation and allows the spring to slip, thus preventing it being overwound. This spring reserve is sufficient to give twenty-four hours' efficient running. Either form of time switch may be fitted with a s.p. single-throw, a d.p. single-throw, or a s.p. double-throw switch, capable of breaking loads up to 50 A at 200/250 V. The case and cover are of cast-aluminium, finished in black shrivel enamel.

Bakelite cased clocks are shown in 5-in. dial wall mounting and 3½-in. dial mantelpiece types, which are available in various colours. Type "H.M.P.P." is a small base meter capable of taking either a penny, sixpence or shilling through the same slot. A recent improvement in this meter is an insulated shutter which operates and closes the coin slot aperture immediately a coin is inserted, and which is not reopened until the meter is fully operated.

Type "H.M.P.P." prepayment meters with a fixed charge collector, and type "H.M.P.P." prepayment meter with a two-rate attachment, are also shown.

Cast-iron and bakelite test blocks with front and back connections for up to 50 A are shown, as are splitter blocks (illus.) which have been developed for accommodating a number of outgoing meter leads to form a small distribution terminal box. The block consists of a neatly designed moulded bakelite case containing two brass stems suitable for inserting in the two meter terminal sockets on the load side. One of the stems is adjustable, thereby allowing the block to be fitted to meters of varying load terminal centres. Each stem provides for three outgoing leads.

British Thomson-Houston Co., Ltd.

This display is intended to emphasise the advance that has been made in the last twelve months not merely in the design of the "Mazda Mercra" lamp for street lighting, but also in the development of lanterns and control gear.

The "Diron" lantern is of rectangular shape and is designed to give directionally controlled illumination. The top cap is round and is made of a special high quality aluminium alloy casting. The canopy is also cast in the same aluminium alloy and can be supplied with a short or long canopy. It is octagonal in plan, and is designed to fit on to the rectangular body of the lantern. The canopy is fixed to the top cap by two swing bolts. The body of the lantern is constructed of a brass casting at the top and bottom, joined by strips of brass suitably formed to accommodate the glass. The bottom panel is hinged while the main body is quickly detachable from the canopy by the removal of eight screws. An internal framework constructed as one unit holds the reflectors and can be detached by removing the canopy.

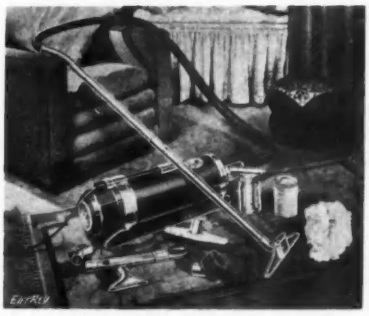
The "Circra" lantern is a diffusing unit and is fitted with a cast aluminium alloy top cap, to which the main body, constructed principally of copper, is bolted. The top cap forms a connection chamber. Where the cables are not fed through the bracket, cable entry is provided for at the side of the cap by a tapped hole which is normally fitted with a plug.

The main body of the lantern carries the lamp holder and a vitreous enamelled reflector. The opal cylinder which encloses the lamp is held in position by a clamping ring supported by three stirrups. The lamp is easily removed from the lantern by opening the gauze cover mounted on the clamping ring. The lantern is ventilated, but all possibility of driving rain entering has been eliminated.

In addition to its stand in the exhibition the company, in conjunction with the Corporation Electricity Department under Mr. P. J. Robinson, has arranged to floodlight the main front of the Adelphi Hotel.

Brookhirst Switchgear, Ltd.

The principal exhibit is a typical example of the company's "Oil Pump" circuit-breaker—400 A, 11,000 V. These breakers embody a novel arc control device in the form of a self-contained oil pump. Before the switch contacts part, there is a rush of cool oil ready to introduce a constantly changing barrier of high dielectric strength and low temperature. The oil pressure, however, is controlled and the arc is not permitted to develop explosively for the purpose of creating oil movement. The oil continues to flow after rupture, condensing the gases and preventing re-striking. The use of cylindrical contacts, with individual cylindrical shrouds, all radially disposed within the cylindrical tank, gives increased rigidity, improved clearances and low space factor. The breaker is isolated merely by the movement of an external handwheel; it can then be readily opened up and the mechanism can be tried out while the switch is "dead."



The new "Electrolux" cleaner

The "Brookhirst" self-contained automatic feeder voltage regulator consists, briefly, of a motor-driven tap-changing switch working in conjunction with an auto-transformer and giving eleven regulating positions. The auto-transformer is housed in the base of the steel pillar. Automatic control is effected by means of a voltage relay which can be suitably compounded to give a rise of voltage with load if so required. The equipment can be housed in an "indoor" type of metal-clad case with wheels at the base to make it as conveniently transportable as possible, or it can be fitted in a case of the street pillar type for standing in an unprotected situations.

Bulpitt & Sons, Ltd.

This range of "Swan" brand appliances includes immersion heater elements and standard kettles, besides which the pattern No. 325 "super-table" kettle which was introduced a year ago at 45s. has been further improved in appearance this season by making its spout of still better shape. The finish is chromium plate on solid copper and the interior finish is pure tin. The body is seamless.

The earthenware percolators may be obtained in three colours, Wedgwood blue, jade green, or lemon yellow. Patterns No. 705 and 710 (1 and 2 kW respectively) sheet metal fires differ from the usual cheap fires in that they are almost unbreakable (no cast iron is used in their construction). They are well shaped by deep stamping and pressing, and have a fire bar with a rounded front containing a well-supported element. This bar is of white refractory material and is arranged at an angle to the ground, giving an upward radiation. The fires are supplied in art silver or art bronze finishes.

Burnley Components, Ltd.

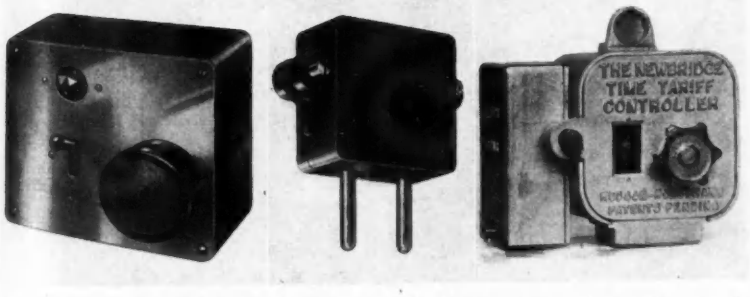
Slight constructional improvements are evident in most models of this wide range of "Burco" washboilers.

The only new model that will be on view this time has a square outer casing and is equipped with a handy vitreous enamelled table top. In addition the company intends to exhibit its recently introduced thermostatic valve controlled circulator.

Carron Company

Special attention is devoted to cookers, among which is the new junior "Carronian" which will cook for three persons. It is fitted with a combination grill-boiler by which boiling, grilling, and toasting can be done simultaneously The oven is heated by plug-in elements and is capable of cooking a 4-lb. joint with Yorkshire pudding or baked potatoes. The grill chamber is fitted with a drop door and can be used as a hot cupboard for warming plates, &c.

The "Carronian" is simple in con-



M.K. water-heater control unit with plug, Sangamo meter connection splitter block, and the "Newbridge" (Horstmann Gear Co.) time tariff controller

struction, replacement is easy, while the overall dimensions are 31 x 16¼ x 14 in., the oven being 10 x 10 x 11 in. The oven loading is 1,250W and the grill boiler 2,000W. The popular "Carronette" and "A" series cookers in attractive enamel finishes will also form part of this exhibit.

The company's two breakfast cookers are to be also in evidence; they are being extensively used for hiring out by supply authorities. The examples of electric fires include a special display of inset fires and various types of surrounds in slate, tile, cast-iron, and wood. Tubular heaters for low temperature systems and irons are also shown.

Corfield-Sigg, Ltd.

In addition to "Corfalgar" aluminium ware a complete range of new "Crown Merton" electric ware comprises stewpans, kettles, casseroles, frypans, egg poachers, and porringers, all of which have a ¼-inch thick base machined dead flat. Every article is fitted with an insulated brown composite handle.

Other electrical items include 2-pt. and 3-pt. kettles and a 2½-pt. percolator, each fitted with an enclosed immersion element, with a safety patent fuse. Of special interest is the new "Merton" steel airing cupboard, fitted with detachable slats and a "Rototherm" thermometer in one of the doors. A "Unity" tubular heater is in the base of the cabinet, which is guaranteed to be shock and fire-proof, and the loading is 120 W; it is finished in white, green, blue, or primrose.

Drake & Gorham Wholesale, Ltd.

A round-tank oil circuit breaker (illus.) displayed is one of a range of such apparatus made in 300- and 600-A sizes, 11kV, with rupturing capacities of up to 250,000kVA. The construction also provides a dished bottom and a domed top.

A 300-A 3.3kV metalclad vertically isolated switch unit shown, is an example of the company's equipment which embodies round-tank oil circuit-breakers. Separate bus-bar and current transformer chambers enable such work as current transformer ratio changing to be carried out while the bus-bars are alive.

Other items displayed by this company include "Densacone" water heaters, electric clocks, "No-los" lagging jacket, "Teesmade" sets, the "Sparton" refrigerator, the "Herald" clock and modern lighting fittings.

Edison Swan Electric Co., Ltd.

The range of lanterns for use with the "Escura" gas discharge lamp includes the "Hertford" lantern for street lighting, giving a two-way non-axial beam with maximum candle power 75/83 degrees from the vertical. Normally the lantern gives an equal beam on each side at 150 degrees in plan, but the horizontal angle is variable and the beams can be thrown out of balance up to a maximum of about 2½ to 1. The lantern is intended for side mounting.

The "Enfield" lantern, giving a two-way axial beam with maximum candle power 75/90 degrees above the vertical, is suitable for suspension over roadway centres. The "Wanstead" lantern, intended for area lighting, has a wide symmetrical light distribution with maximum candle power at 40/70 degrees from the vertical.

The flood lanterns for use with "Escura" lamps include the "Saturn," which is suitable for floodlighting the vertical face of a building from ground level, and the "Waltham" lantern having a wide asymmetrical light distribution with maximum candle power at 50/60 degrees from the vertical, suitable for lighting horizontal and vertical surfaces located on one side of the unit.

The "Tresco" dryer can be used for drying clothes electrically. It is particularly suitable for flats, hospitals, etc., where space for clothes drying is limited or non-existent. "Tungar" battery charging outfits are also shown and a wide range of "Ediswan" cables includes both earthed and unearthed house wiring systems.

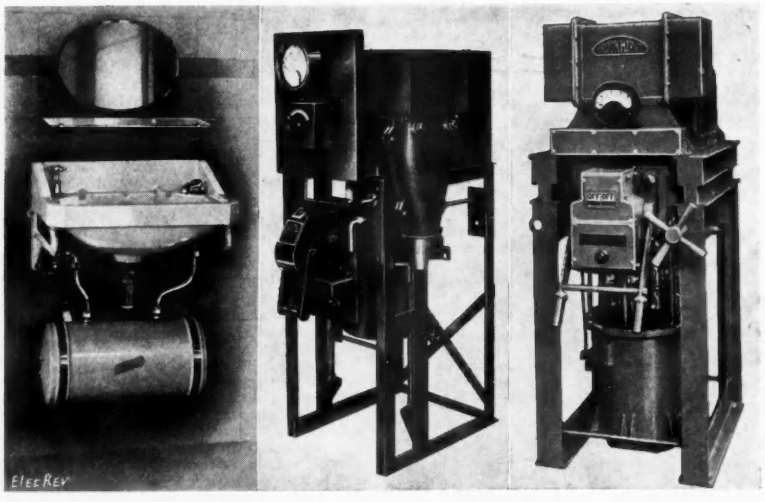
Electric Fires, Ltd.

The attractive centre piece consists of a 12-gallon size "F.B." cistern type water heater with piping connections to three drawoffs, cold water feed being direct from the main.

The corner pieces are examples of the "Heatrae" under-the-basin type heaters, which are shown under actual working conditions, delivering hot water.

A 16-gallon type "A.U.X." water heater for floor mounting, with front entry heating elements, illustrates the application of a complete electric water heater that will work in conjunction with a coke-fired boiler or range boiler. A 12-gallon displacement type "R.T.A." pattern, made in accordance with E.D.A. recommendations, is specially suitable for supplying hot water to a bath.

There is also shower equipment complete with mixing valve, a "Flat 3" displacement type water heater, for lavatory basins, a 1½-gallon type "N.R.D." heater specially constructed for use at kitchen sinks, and examples of copper pipe work for connecting up water heaters. A 1d.-in-the-slot machine delivers a pre-determined quantity of hot water, and the "H.S." type has mixing valves and a hose spraying device for use in hairdressing saloons.



A "Highlow" under-the-basin water heater, a Drake & Gorham Wholesale switch unit with round-tank circuit-breaker in isolated position, and a Brookhirst "Oil-Pump" circuit-breaker

An auto-circulator and methods of application are shown, also a removable core tubular type; and the latest innovation is the "A.C.E." automatically controlled immersion heater for horizontal working. The whole device is contained in a 2-in. pipe threaded gland, which greatly facilitates fixing to the storage vessel and avoids the necessity of cutting big holes.

Electric Lamp Manufacturers' Association

Luminous wall diagrams which show the magnitude of the lighting load in various fields of application, include a map of Great Britain showing towns and districts with 100 per cent. electric street lighting; pillargraphs showing the development of the street and lighting loads; a diagram depicting the growth of the domestic lighting load; and illustrations of the increase of factory lighting and of lighting load increases due to rebuilding operations.

There are demonstrations dealing with lamp quality, the new architectural

The "Heatrae" type F.B. water heater

tubular lamps, and the relative cost of light compared with other commodities in everyday use, while a cinematograph projector illustrates the activities of the E.L.M.A. Lighting Service Bureau.

There is also a complete display of the demonstrations carried out by the E.L.M.A. touring demonstration van, which has visited over 60 centres, giving lectures and demonstrations attended by over 8,000 persons. "Load Building with Light" is a book specially prepared for delegates to the exhibition.

Electrical Association for Women

Books, journals, posters and leaflets will explain the aims and objects of the Association and the training facilities it provides for women in the industry.

Electrical Development Association

The exhibit (illustrated on page 736) takes the form of examples and illustrations of the organisation's national publicity services.

A special tableau has been arranged on behalf of the City of Liverpool Electric Supply Department at the entrance to the Exhibition, and this embraces a special scheme of concealed illumination.

Electrolux, Ltd.

On this stand there is a comprehensive range of automatic refrigerators which are motorless and silent, and operate without moving parts. The storage capacities range from 1 to 45 cu. ft. Two low-priced air-cooled cabinets are the "Minor" model (1 cu. ft. capacity), a self-contained automatic equipment, and the L.2 (2 cu. ft.), which has a 10-point cold control. The "Minor" is suitable for building into the permanent structure of the small house or flat; it will fit comfortably beneath a draining board, in a dresser or store cupboard, and can then be painted to harmonise with the existing decorative scheme.

The new Electrolux cleaner which is shown has considerably increased suction power.

English Electric Co., Ltd.

This range of domestic cookers comprises the small "Cottage" and small and medium "De Luxe" sizes, the last mentioned being now also available in a cream and green finish. In addition, a new model has been added, which will be known as the "No. 1 Cooker," fitted with "Thermentor" oven control. Two new breakfast cookers will also be on view.

Push-type 1.5-gallon water heaters in a range of four different colours are offered as well as a 12-gallon size in a cream finish. Several new finishes are also being introduced for the portable electric fires in 1-, 2-, and 3-kW sizes, as well as chromium-plated reflector fires with and without tubular frames; cast-iron coloured enamel varieties; chromium-plated and French grey insets; and a marble and chromium inset.

Evershed & Vignoles, Ltd.

The "Triplex" recording voltmeter can be used to record simultaneously on a 6-in. chart the voltage on each phase of a three-phase system, while the straight time lines enable the simultaneous values to be read easily. The movements are carried on spring-mounted jewels, while the "pen to paper" friction is reduced to a minimum.

There are also shown a switchboard-type frequency recorder with a range of 47/53 cycles per second; a wattmeter for three-phase unbalanced-load circuits; and a portable recording voltmeter. A 7-pen operation recorder combined with a recording ammeter is suitable for showing the times of starting and stopping of a number of pumps, engines, &c., in conjunction with the total load.

The Evershed self-protecting leakage ammeter with a recorder is used extensively for recording the leakage current to the star point of three-phase high- and low-pressure systems.

The "C. & S." no-contact system of remote indication, and also the "Megger" system as applied to water and sewage levels are being demonstrated.

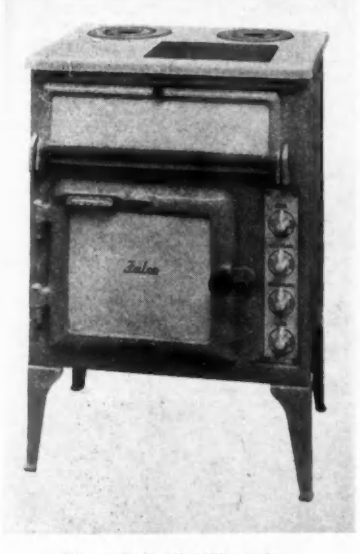
Falk, Stadelmann & Co., Ltd.

The outstanding feature of a wide range of domestic apparatus is the new "Servis" cooker which was described in our issue of April 27. The oven has plug-in pancake elements which embody steatite tubes carrying the resistors housed in pressed-steel cases. Medium heat is only one-quarter of full heat, and low-heat is only one-sixth of the total. An adjustable hinged door in the main oven door prevents steaming. Operation of a push-button allows the hob to be raised, when a simple automatic strut keeps it open. The cooker is available in four models, the smallest having a 2.5-kW griller-boiler and oven loading of 1 kW. It is priced at £5 16s. 6d.

Falkirk Iron Co., Ltd.

The main exhibit of this company is a complete range of "Falco" cookers, from the small family model to the large double-oven type. Attention is directed to the new small No. 5369 cooker, which, with its "plug-in" connections throughout and robust construction, ensures maintenance costs being kept to the minimum.

A special feature will be made of mantel electric fires. The fire portion is readily detachable from the mantel, which is suitable for wall fixing, and a



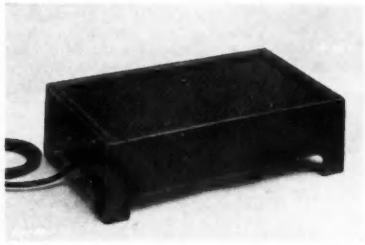
The "Falco" 5379 cooker

variety of attractive finishes for these fires is available. In addition, a range of portable fires and irons will be on view.

Ferranti, Ltd.

Thermal storage water heaters of various sizes include a model designed for hairdressing establishments; it does not need complicated mixing valves and simplifies the piping arrangements. Immersion heaters are made of different types; some are fitted with the "Adjusto-stat," which enables the temperature of the water stored to be controlled between predetermined limits by the user. For normal operation the temperature can be set low, whereas on occasions of peak demand it can be increased by adjusting the high setting. This results in a considerable saving of radiation losses, and consequently lowers the running cost. A form of lagging jacket for tanks, known as the "Nolos," is suitable for vertical and horizontal use.

In the range of radiant fires are new models which have been designed for use by architects and builders in the construction of new property, as they are primarily intended to be permanently built into bedroom walls. These panel fires are made in 750-W and 2.5-kW sizes in a variety of designs, settings, and finishes. Since they have a perfectly flat back, there is no need for special preparation or recessing of the



The "Handy" P.H. convector

wall, while chimneys or flues are not required, building costs being thereby reduced.

New styles have also been added to the range of synchronous a.c. mains driven clocks.

General Electric Co., Ltd.

One of the most important exhibits by this company is a new 8 in. high-speed "Magnet" hotplate. Of particular interest is the fact that the temperature of the embedded wire at a loading of 2,250 W is actually lower than has been the case with a loading of 1,800 W. The performance is claimed to be good with any type of utensil, and the life of the new plate should be longer than that of the existing pattern by reason of the lower wire temperature.

A new water heater incorporated in the pedestal of a wash basin saves a considerable amount of space and enables the complete unit to be installed in any desired position. Another new water heater is a 15-gallon cistern pattern for corner mounting on a shelf. Of three new cookers shown, one is for very large families, another is comparatively small and has a quick-boiling hob hotplate and a top heat oven for grilling purposes, while the third is a new storage-heater cooker incorporating many improvements over the existing type. A new washing machine is also shown, and there are new types of wash-boilers with hotplates clamped to the underside of the boiler.

Specially designed street-lighting fittings for accommodating "Osira" gas-discharge lamps are on view, as are examples of improved "Wembley" street-lighting lanterns.

George Green & Co.

The following items are included in a wide range of domestic "Gee-Gee" equipment. The "One Point" open outlet automatic storage heater has an immersion heater complete with a thermostat having a mercury switch suitable for a.c., an anti-drip device, overflow pipe, c.p. inlet valve, outlet spout and draining plug. It is available in 1½-, 5- and 12-gal. sizes, the largest model measuring 18 in. in diameter and 32¼ in. high. An automatic miniature distiller loaded at 200 W will distil two pints of water for a consumption of little more than 1 kWh. It costs 50s.

The "Margery Daw" electrically heated washer with a water capacity of 12 gal. is loaded at 3 kW; the "Junior" washboiler holds 8 gal. of water and is loaded at 2.5 kW. The "Corporation" washboiler is slightly larger and holds 10 gal. (3 kW). There is an automatic immersion heater complete with a thermostat, and an electric urn with an automatic cut-out to prevent damage to it if it is boiled dry.

Greene, Phillips & Co.

Among the various models of "P.H." convectors displayed on this stand is the new "Handy" heater which has been specially designed for use in airing cupboards. The elements sustain an average temperature of 165 deg. F. without deterioration, and the case remains quite cool while in operation.

The three models, GM1 (150 W), GM2 (220 W) and GM3 (350 W) measure 12⅜ by 5¾ by 5 in., 13½ by 7¼ by 5 in., and 16½ by 9¼ by 5 in., respectively.

Hagué & McKenzie

This already extensive range of "Pyramid" aluminium ware is constantly being enlarged. Flat bottomed kitchen utensils specially designed for hot-plate cooking are now obtainable in about 110 different sizes and shapes.

L. G. Hawkins & Co., Ltd.

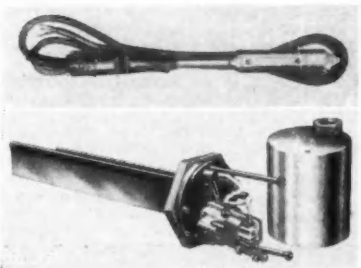
The "Supreme" culinaire, priced at £6 10s., is a comprehensive kitchen machine of the bowl pattern, with the driving motor enclosed in the base, which can be used for mixing, slicing, shredding, grating, chopping, mincing, fruit-juice extraction, &c. The floor polisher is listed at £6 15s. and the suction cleaner costs £7 10s., having an automatic nozzle attachment and a self-starter switch actuated by the handle. The clothes washing machine with wringer attached has a cream porcelain tub and is priced at £21. Besides other domestic appliances, "Finray" and "Gossama" lighting fittings are available in a large variety of designs.

W. T. Henley's Telegraph Works Co., Ltd.

The domestic model of the "Solon" soldering iron has been completely redesigned. It is available for voltages of 200/220 and 230/250, and the loading is 65 W.

The new "Empire" model (65 W) has an improved copper bit. Two new industrial models (125 and 240 W) have been specially designed for heavy work, and are supplied for 200/220 and 230-250 V.

The domestic "Solon" waffler (32s. 6d.) is available with the base in a choice of colours, and the grid is encased in a chromium-plated steel shell. The café



A new "Solon" soldering iron and the "Gee-Gee" automatic immersion heater with thermostat

model (47s. 6d.) is designed for use where there is not constant supervision. It is fitted with a thermostat and an extended lifting handle on the lid. The grid is encased in a chromium-plated steel shell, and the base is of porcelain enamelled cast iron.

The restaurant model is fitted with twin grids and provided with thermostatic control and indicating lamps. There is a representative range of insulated and ironclad service cut-outs, while the Henley wiring system is effectively displayed. "Thermoid" flame-resisting and unkinkable flexible cable is shown fitted to various domestic appliances.

Horstmann Gear Co., Ltd.

A full range of "Newbridge" time switches includes 15-, 21- and 40/42-day synchronous motor or electrically wound models.

With the "Newbridge" solar compensating dial the lighting and extinguishing curve can be reproduced with complete accuracy, in addition to the standard solar curves. A new time tariff controller is designed for the weekly collection of a standing charge in connection with two-part tariffs from slot-meter consumers.

Hotpoint Electric Appliance Co., Ltd.

A range of "Hotpoint-B.T.H" cookers displayed includes a new small model designed to meet the demand for housing estates, flats, &c.; it is suitable for families of from three to five persons.

Other cookers are suitable for families of from four to six and six to eight persons. All these models incorporate "Torribar" radiant boiling plates, which, it is claimed, do not demand the use of special utensils.

Water-heating circulators have heating elements of the "Torribar" sheathed wire type. They have a boss of minimum dimensions, and are comparatively light in weight. Hot water is delivered in the top of the domestic cylinder and it is ready for immediate use.

With the company's washing and ironing machine which may be seen also, washing for a family of four or five people can be completed in an hour.

The "Hotpoint Junior" vacuum cleaner has a motor-driven brush located in the nozzle of the machine so that the carpets are thoroughly agitated and cotton threads and hairs, &c., are quickly and easily removed in the cleaning operation. A floor polisher can be quickly attached to this machine. A popular feature of the "Hotpoint" iron is the flexible cable support which ensures the trailing cable being kept well out of the way during operation, while the "Butonook," a small slot in the side of the sole plate, permits ironing satisfactorily underneath buttons.

A full range of domestic appliances shown includes automatic kettles, toasters, shaving mirrors, warming plates, grill-boilers, "Bandolero" fans, inset fires and storage water heaters.

Jackson Electric Stove Co., Ltd.

A complete range of up-to-date "90" series electric cooking cabinets includes the popular "91 J," of which more than 20,000 were sold during 1933, and red-hot plates will be specially featured.

Wash-boilers will also be on view: a model in brown japanned finish, one in grey cellulose, and a third in white cellulose with chromium-plated fittings.

The new inset type fires, which are a recent addition to the Jackson range, will be the subject of a display stand specially arranged to demonstrate the effects to be obtained by the adoption of various coloured fires to different decoration schemes. These insets are made in 1-, 2- and 3-kW sizes, and are readily adaptable to existing surrounds as well as for new property.

A 1½-gallon thermostatically controlled "Quick Service" water heater, a 12-gallon storage model, and a 12-gallon ball valve storage heater will also be included in the exhibit.

Johnson & Phillips, Ltd.

"Charlton" water heaters in sizes from 1½ gal. are displayed, including the

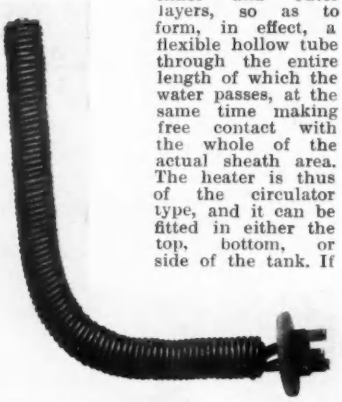
Charlton rectangular cistern type water heater (Johnson & Phillips)

new 30-gallon rectangular cistern-type heater (illus.) which forms one of a range of 12-, 15-, 20- and 30-gallon heaters. Welded copper containers and ball tanks, tinned inside and out after welding, are standard, the latter being enclosed in the outer casing and heat insulated from the storage tank. The cold-water feed is not heated. The hot-water outlet is arranged near the wall, and the cold inlet and overflow connections can be changed over to left or right hand. E.D.A. loadings and fixing centres are usual. Flexible elements are fitted to all "Charlton" heaters, and careful arrangement of the outlet and inlet pipes ensures a saving in plumbing costs.

Specimens of "Stronkor" cable, specially produced for all types of portable domestic appliances, are displayed, and special enlarged samples, showing the whipcord centre, are available for demonstration. The J. and P. drop-out switch-fuse is an item of special interest to supply engineers.

J.P. Tubular Heater Co., Ltd.

The "J.P." flexible immersion element for water-heating equipment is constructed of an insulated and sheathed resistor which, as a whole, is double spiralled, *i.e.* with inner and outer layers, so as to form, in effect, a flexible hollow tube through the entire length of which the water passes, at the same time making free contact with the whole of the actual sheath area. The heater is thus of the circulator type, and it can be fitted in either the top, bottom, or side of the tank. If



"J.P." flexible immersion heater

fitted in the tank side it should be bent to provide efficient circulation. Bending is permitted to any desired angle, and the unit retains its bent form, so that the hot water can be directed to the outlet, irrespective of the latter's position. The heater is adaptable to any form of automatic or non-automatic switching, and is loaded at 3 kW; it is available in lengths of from 20 in. to 42 in. (inside tank), a standard 20-in. heater costing £4 5s., or £6 15s. when incorporating a thermostat. The longer heaters are also available loaded at 4 kW. Suitable fixing flanges are available, and all sizes are arranged for three-heat control.

Leda Electric, Ltd.

Outstanding among the exhibits of this company are models S.M.1 and S.M.2 domestic refrigerators of 5 and 7 cu. ft. capacity, retailing at 38 and 48 guineas respectively. They are of all-steel cabinet construction, with an unbroken front, a flat usable top, and finished in white enamel. Other features include chromium-plated fittings, a porcelain interior with rounded corners, multi-cold control, and robust heavily tinned shelves.

Liverpool Electric Supply Department

Three cubicles in the main entrance hall, arranged in conjunction with E.D.A. (see page 736), divided by architectural lighting, will portray on either side the domestic and commercial uses of electricity, while the centre will represent street and shop lighting and the part electricity plays in transport. Within the hall will be an inquiry bureau, and displayed therein will be samples of the appliances which the Department supplies to consumers on simple hire terms.

Archibald Low & Sons, Ltd.

On this stand may be seen water heaters of various types and sizes to meet special requirements, as well as top entry circulators, with and without thermostats, side entry circulators, external circulators, various types of immersion heaters, and an automatic water boiler for tea making.

A new 2-gallon rectangular non-pressure type water heater is specially designed for use where there is hard water. The outlet syphon non-drip device can be removed through the top of the tank in a minute for cleaning, and at the same time the outlet pipe can be cleaned without having to take it out of the tank. It is also possible to clean the inlet pipe from the top and, if desired, withdraw it without disturbing any electrical connections.

The "Highlow" under-basin type water heater (illus.) can be adapted and fitted to existing basins, the existing cold- and hot-water taps being taken away and an open-outlet connection fitted to one of the positions; to the other position is fitted a special mixing valve. By turning the one handle either cold, tepid, or very hot water can be obtained in the basin.

Measurement, Ltd.

Type "Z" overload pattern single-phase watthour meter is characterised by its low speed, ease of calibration, low losses, high torque, extreme accuracy, and long range.

The ordinary straight prepayment meter for both 1s. and 1d. coins is well known in this country. A new feature is the step rate meter known as types P.A.T. (for a.c.) and P.D.T. (for d.c.), which are designed to operate alternatively at high and low rates per "unit," the high rate including the flat charge for energy plus the rental charge to be collected, and the low rate being simply the flat rate itself. The meter can be set to collect the desired rent over a month, or quarter, or such period as may be desired. These meters can easily be reset by a suitable lever operated from a position in the meter not accessible to the consumer. The company can, however, supply a meter known as the type P.A.T.A. for a.c. and the P.D.T.A. for d.c. whereby the withdrawal of the coin box by the collector at the end of the period automatically puts the meter back on to the high rate.

Type H.M. mercury motor ampere-hour meter for d.c. quarterly pattern has been on the market for many years and polyphase meters of the two and three element types for use on unbalanced loads will also be shown, as will also current transformers of 100/5 A up to and including 1,000/5 A capacity.

The "Klixon" high capacity thermostat is successfully used in such articles as electric irons, kettles, waffle machines, while the company has the exclusive manufacturing and selling rights of the "Ritter" thermostat in this country. This low capacity thermostat is especially suitable for such devices as heating pads, heating blankets, and domestic appliances requiring heating control.

A novel circuit-breaker will also be available for inspection.

M.K. Electric, Ltd.

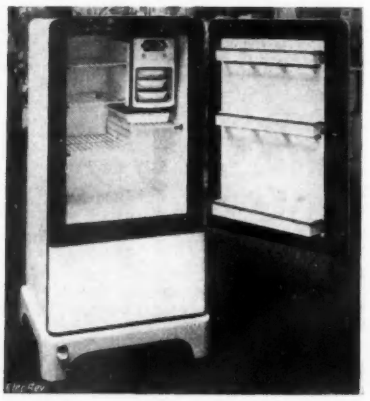
A complete range of cooker control boards is shown. Certain features, common to all types, include the specially designed and constructed d.p. main switch, the handle of which is conveniently mounted on the front of the panel.

The fuses are of the pin-and-socket type, and it is a simple matter to rewire the fuse carrier. In all cases the switches in the secondary circuit are modern double pole units designed to save servicing costs. A "change-over" main switch can be fitted to permit the water-heating load being kept off the cooking peak.

Control units for water heating (illus.) consist of a d.p. switch and a pilot lamp mounted in a suitable iron box, and are supplied suitable for surface or flush mounting. The MK "Point Box" is designed to permit an adequate number of 5-A "convenience" points in a room. It is looped from the 15-A power point fitted adjacent to it, and then on to the looped "convenience" sockets.

Moffats, Ltd.

These refrigerators (illus.) have the conventional type of compressor, driven by a one-sixth h.p. motor, the refrigerant being methyl chloride. The cabinet is porcelain enamelled inside and out,



A Moffat refrigerator

and two colours are obtainable, either white with a French grey base, or a two-tone ivory. The door is designed to cover the entire front; it has ball-bearing hinges and is recessed to accommodate extra food racks. Corners are rounded for easy cleaning, and the polished "Kromoid" metal racks will not rust or become dull. Temperature is controllable in nine steps, and an interior lamp is automatically controlled by the door. The unit is sealed in oil and has only three moving parts, the cabinet being constructed of steel and wood, with 4 in. of insulation at the bottom and 3 in. at the top and sides.

Radiovisor Parent, Ltd.

This display of light sensitive devices includes new models of both a.c. and d.c. lighting control units as well as of counting gear for use in conjunction with conveyors and elevators.

An industrial smoke indicator will be on view of the type installed at the Barking, Battersea, Brimsdown, and Wimbledon power stations, in addition to experimental highly-sensitive apparatus.

Revo Electric Co., Ltd.

Prominence is given to a range of cookers, and to the latest developments of the "Superspeed" in the form of a rectangular grill-boiler. This new dual-purpose unit is entirely open, and there are no solid masses of metal to heat up, the naked element being visible above and below the hob. A feature of the cookers with top and bottom heat only is the new corrugated-side oven. This oven has louvre type rack runners which obviate separate rack runners, increase the size of the oven, and make cleaning still easier. The racks cannot tilt or slip, and all corners of the oven are gently rounded.

Water-heaters, washboilers, circulators, immersion heaters, boiling plates, grillers, toasters, fires, irons, kettles, fans, and the latest designs of street-lighting fittings are also to be shown by the company.

A. Reyrolle & Co., Ltd.

The new all-insulated house-service fuse-box (illus.) consists of three distinct

Reyrolle all-insulated 30-A house service fuse box

parts—a cable sealing box, a self-aligning fuse and a separately enclosed neutral link, all the insulating and enclosing parts being made of moulded insulation. When assembled, the cable box cover locks the fuse-handle in such a way as to prevent its removal, and this cover and the neutral link cover can be sealed. One of the cable holes in the box is bushed, and the other two have "knockouts" for enabling loop connections to be made.

The unit can be supplied with a split cable box in place of the solid-type cable box, and extended terminals can be fitted to the fuse and neutral unit for taking cable conductors up to 7/0.064 in. Double fuses can also be supplied, the live contacts of each separate pair of fuse bases being coupled together to permit two separate distribution circuits for power and lighting, thus forming a convenient method of tapping one feeder to serve several circuits.

Other equipment displayed includes "Easigo" plugs and sockets (1934 design), the "Reydome" ceiling radiator, market lighting equipment, a metal-clad cooker-control unit, a "Reylovolt" low-voltage transformer, the "Reymez" pedestal wash-basin with a self-contained electric water heater, domestic water-heaters, "Reywood" domestic water heaters, immersion heaters for oil-heating, &c., a model of an electrode water heater, and a Eureka vacuum cleaner.

David Rowan (Vidro), Ltd.

This company is demonstrating every stage in the manufacture of luminous gas-filled tubes, including all descriptions of tubes, electrode making, pumping, bending, bombarding, filling, ageing, and finishing the complete article. The latest type of two-stage rotary oil pump capable of producing a vacuum of 0.00001 mm., may also be seen, and there are examples of past and present electrodes, transformers, and all other equipment appertaining to neon sign work. Specimens of finished work are also on view.

Rushworth & Dreaper, Ltd.

This company is displaying a detached console of a Rushworth "Cappella" organ, containing an ingenious system of remote electrical control, so overcoming the obstacle of distance between key and pipe.

The "Neo-Bechstein" is a "miniature grand," the almost inaudible tones of which are made audible by "magnetic microphones," through a special amplifier and conveyed to the listener by means of a loud-speaker.

Santon, Ltd.

Water-heating equipment displayed by this company represents many forms of heating for quick-service thermal-storage and for various forms of conversion schemes. The last-mentioned include the circulator and "Circ-stat," which offers a convenient and efficient means of providing electrically heated water for all household purposes. The company's belt heater for the external heating of cylinders is claimed to be the only one which offers a system of conversion equal in every way to immersion heaters of equal loading, and obviates the necessity for piercing the container when fitting. Thermal storage heaters are available in sizes from 1½ gal. to 100 gal. and the range now includes hairdressers' equipments in various sizes.

Quick-service heaters for either one or a number of points include the new "Soon Hot" unit. The "San-Spray" provides a hot shower bath in eight minutes for less than 0.5 kWh consumption. Gradual cooling to quite cold is an important feature. It is estimated that bathing by this means will save 70 per cent. to 80 per cent. of the usual household demand for water. An ingenious arrangement for supplying small quantities of water is also incorporated.

There is also on show a complete range of switches and control units.

Siemens Electric Lamps and Supplies, Ltd.

A representative display of "Xcel" appliances includes water storage tanks, immersion heaters, tubular heaters, fires, irons, kettles, and a range of new cookers. The plug-in elements of the cookers have contact pins of monel metal and terminal sockets of solid brass, slotted. Each pin is separately insulated, and floating, ensuring correct alignment.

A new type of griller-boiler has a stainless deflector plate. A separate panel in the switch box provides for such optional extras as a main switch, pilot light and switchplug.

Meters exhibited include two new "Cost-per-hour" instruments with specially designed connectors which enable the cost of any domestic appliance to be demonstrated. The major interest of the new "Sieray" gaseous discharge lamp lies in the daylight quality of the light emitted.

Simplex Electric Co., Ltd.

This display of the products of the Credenda works comprises cookers, water heaters of both the storage and immersion types, wash boilers, tubular heaters, kettles, irons, &c. The cookers will be fitted with the recently described glowing "Lightning" boiling plate which is designed to be foolproof for reliability.

In addition "Creda" standard and rapid "Duo" boiling plates are particularly suitable for d.c. systems, and the range of "Simplex" cooker control units with black and vitreous enamel finishes is comprehensive. The exhibit will be supplemented by a selection of lighting equipment, among which besides a wide range of industrial and street lanterns there are types specially intended for gaseous lamps.

Road traffic signs of both the "Simplex" and "Gowshall" designs are also to be seen on the stand.

Stokes Appliances, Ltd.

There is shown an electric table cooker with a special attachment which enables it to cook fowls and joints. Replacement elements are also displayed.

Unity Heating, Ltd.

Among room heaters is the steel tubular pattern with flexible mica element

The new G.E.C. low-priced washing-machine and the Santon circulator

frames, which do not embody refractory or other fragile materials, joined by alloy bridges with a single locking nut. The "flood" radiator projects heat from a plate with an insulated back, carried on brackets for mounting on the wall or suspension from the ceiling. The latest panel radiator is of all-steel construction and can be semi-invisibly installed flat without restricting the wall or floor space; the elements can be easily withdrawn and reinserted.

Combined heating and lighting units are made of welded steel or brass frames, with coloured glass panels. "Unity" water heaters are rectangular and are made with nickel-silver containers and mechanically folded joints. The smaller sizes embody a syphon which obviates dripping, while the larger models have patented twin containers, each with its own immersion heater and thermostat, which are claimed to improve the recuperative power, since the inner one is loaded relatively highly.

Besides hygrostats and comfort thermostats, temperature controllers include a new combined thermostat and hand switch, the extra cost of which is less than that of a separate "on-off" switch.

Vacuums, Ltd.

Suction cleaners of the "Bustler" and the "Eleta" types are being shown on a stand which the company has taken over from the Electric Domestic Appliance Co., originally intended for a joint display to include such "Edac" products as water heaters and clothes wash-boilers.

Venner Time Switches, Ltd.

To a comprehensive range of meters the latest additions are the two-rate and hour meters. In the former case the change over from high to low rate, or *vice versa*, is effected by a synchronous motor clock, and a feature is that no "idler" wheels are employed in the counting trains when either of the two rates are in use. The hour meter is synchronous motor driven and records in hours up to 1,000.

An improved type of two-part tariff meter provides for variable rental charges between 3d. and 8s. per week. Other types are rent collection, prepayment, and forms of prepayment meters allowing for the supply company to convert to two-part tariff meters at some future date if desired.

The range of switches exhibited is varied, and types fitted with electrically wound, hand wound, and synchronous motor-driven clocks can be seen.

The range of stop-watches includes an electrically operated watch for use at 4 V. A frequency control clock is shown with two dials, one of which is maintained at correct time and the other is synchronous motor driven from the supply to be controlled. Various accessories include the solar dial and a small and compact epilame oiling outfit.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Cheap Power for Industry

How do the supply authorities expect industry to electrify if they do not offer competitive rates which will attract large power users? As an illustration of what I mean, I know of a prospective consumer who, if he changed his factory over to electricity, would have an annual consumption of over two million kWh. He is willing to install the necessary transformers and h.v. switchgear and the power factor would be close to unity. Yet the best rate the supply authority offers averages out at hundreds of pounds per annum more than the cost of the steam driving which is at present in use. Adding the cost of the actual change-over, it is certainly not an attractive proposition.

The supply authority concerned appears to base its rate on the cost to the consumer of generating his own supply. This is, I think, a mistake, as most consumers are not concerned with the question of generating a supply. What is wanted is power from the grid at a price which compares favourably with the cost of other power systems. Is cheap electricity not one of the main reasons for the grid scheme?

If the supply authority would reduce its rate by a very small fraction of a penny per kWh, the consumer to whom I have referred would be justified in installing the new plant necessary and changing over. In view of this it is surprising that the authority should be prepared to lose the sale of two million kWh per annum rather than concede the difference in the rate which would ensure the connection of the load to the mains.

JAS. MCCARTNEY.

Kilburnie, Ayrshire, *May 21st.*

Main Switch Control

The supply authority who refused connection to the installation which Mr. Gray mentions was, I should say, wrong in point of law.

The last paragraph of Regulation No. 27, Section (iii) of the Electricity Supply Regulations, 1934, for securing the safety of the public and for ensuring a proper and sufficient supply of electrical energy, definitely states that compliance with the I.E.E. Wiring Rules shall be deemed to fulfil the requirements of that Regulation. There is only one other regulation giving an undertaker power to refuse a low-voltage supply, and that is the preceding one (No. 26), and this rule deals with leakage.

This matter was dealt with in the ELECTRICAL REVIEW of January 5th, 1934, see "Safety and Sufficiency of Supply," sub-heading "Supervision of Consumers' Installations." Some supply authorities have had rules of their own incorporated in the local bylaws, and it is only in such circumstances that they could legally enforce them.

B.

May 19th.

Balancing Networks

In your issue of May 18th Mr. T. G. Partridge states that the purpose of his article is to stimulate interest among young engineers who are entering upon distribution work, but I suggest that the subject is of quite as much importance to those of us who are and have been engaged in distribution for a long time.

The achieving of high all-round distribution efficiency is, as pointed out by the author, not possible without good balance. The methods described are sound and practical as a means of minimising the losses on distributors. It occurs to me that the contribution would form a good basis for a paper before our Institution, and I have no doubt of the appreciation with which it would be received by members. With the discussion it would cause it would provide a valuable source of reference for electricity supply men.

We require more papers of this nature, and I congratulate the author upon this valuable contribution. Mr. F. D. Parker's article in the same issue is also worthy of a wide circle of readers.

C. J.

Newcastle-on-Tyne, *May 18th.*

How to Sell Domestic Service

I must congratulate Mr. H. Smith on his article in your issue of May 18th. At last someone has come down to brass tacks and realised that £15 is about the cost that average owners of ordinary six-roomed houses can afford to pay, and

Liverpool—This Year's Meeting Place of the I.M.E.A.

1. An aerial view of the waterfront. 2. The University. 3. St. George's Hall, where the meetings are being held. 4. The Cathedral, which is still under construction

that money is what must be saved—not labour, as too many people think.

This class of consumer will be the backbone of the grid when current is ½d. per kWh, but few realise this, I think. I have applied considerable thought and time to the cost of an "all-electric" home and find that using "Cleanglow" in its own special fireplace my coal bills are reduced by half. I could not afford winter radiators at 1d. per kWh. This saving of fuel allows me to experiment with tubular heaters in the bedrooms, but the running charge for these will have to be reduced considerably below 1d. per kWh before I can extend beyond one small room. There is a big market for these at a reduced running charge, as many houses of the type in mind have no kitchen stove but a flame-back boiler in the dining-room fireplace. I heat my kitchen now—twelve hours per day—with a gas radiator at a cost of 3d. per day; a 750-W tube at 1d. per kWh is beyond me.

On the matter of service, a request for the hire-purchase terms for a 3-gal. electric tank met with most perfunctory treatment—one letter, then silence. I walked round for a chat with the gas people and a salesman was on my doorstep the next day with an offer of 6s. 6d. per quarter for five years, tank ready for use, with the first small payment. Cost for cost, with gas at 1s. per therm and electricity at ½d. per kWh the two tanks are equal, but look at the difference in the initial outlay and service! I have not yet decided which to install. I am always impressing on acquaintances that "juice" at ½d. is cheaper than coal fires, but why is the price put up to 1d. when we want it in the winter? Doesn't the industry want the load? I trust somebody will take up my plea for tubular heaters, thermostatically controlled, at a reduced rate. They are cheap to buy, easy to install, and not an eyesore.

Another plea would be to certain classes of people trying and actually persuading people poorer than I am to install electric fires at 1d. per kWh. They do the industry more harm than good and must know it simply "can't be done."

Harrow, *May 18th.* JOHN C. HOLDEN.

What Is Ohm's Law?

I cannot agree with your comment on my letter in the ELECTRICAL REVIEW of May 18th. Ohm's law postulates nothing concerning physical conditions constant or variable; and nothing concerning the materials of any circuit, which circuit may comprise any variety of "resistors."

The impedance of a neon tube is not a pure resistance—far from it; the voltage drop across it is not the "E" of Ohm's law. It is possible that the conducting path in a neon tube is not identical for different values of the current. The filament of a carbon lamp may be said "not to obey Ohm's law"; its resistance decreases with the current through it—an indirect effect due to the rise of temperature of the filament. But its resistance at any part of the curve is an ohmic resistance and can be measured by a Wheatstone bridge at any point; so soon as the filament reaches a temperature at which radiation balances the volt-ampere input the resistance becomes constant. If artificial cooling of any sort is applied the resistance for a given voltage drop becomes constant at a higher value; and the voltage drop is the equivalent of the "E" of Ohm's law for that bit of the circuit, at all values of the current.

It is interesting to measure the resistance of a carbon lamp over a range of current values; say with from two to six Leclanché cells, or by altering the values of the ratio arms of the bridge. The change of resistance to a steady value for each current can be watched and measured, as it takes several minutes to settle. A tungsten filament may equally be said "not to obey Ohm's law," the changes in resistance are in the opposite direction to those of a carbon filament.

The "E" of Ohm's law applied to any circuit is the algebraic sum of all the e.m.f.'s in that circuit at any instant; for any bit of the circuit it is the voltage drop across it *only* when that bit is a pure resistance, free from reactive, thermal, or polarisation e.m.f.'s. I hope that you will find it possible to concur and to advocate the disuse of the objectionable expression. HENRY M. SAYERS.

Streatham, S.W.16, *May 19th.*

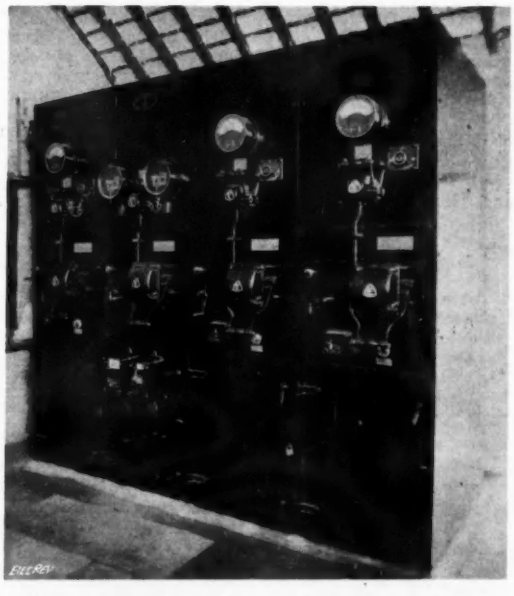
Slate Quarrying

Electrical methods used by an ancient industry

MANY of the Welsh slate quarries are hundreds of years old, but the North Wales Power Company's overhead distribution, which takes the mountains and valleys in its stride, makes it possible for them to be worked by modern equipment. Power is supplied to groups of quarries at 10,000 V, 3 phase, 50 cycles from interconnected switching stations built at intervals in the run of the h.t. line. One of these sub-stations at the Maenofferen Quarry, Blaenau Festiniog, is situated about 2,000 ft. above sea level.

Slate quarries can be divided roughly into two groups—open quarries and tunnelling quarries. The open quarry employs a drive probably not used in any other industry, the tight rope or "Blondin." These "Blondins," stretched from side to side of the pit, are in many cases 200 yds. long. A small cage is hauled along the rope to a given point, from which it descends to the bottom of the pit, frequently 60 yds. deep, to be loaded with slate and hoisted to the surface.

It is essential that these drives be perfectly smooth, and great care has to be taken not to snatch at the cage, otherwise the slate blocks will be tipped off and broken. The slip-ring motors used for this duty are of about 60 h.p., and are controlled by crane-type reversing controllers.



11,000-V "Ellison" cubicle switchgear in a sub-station 2,000 ft. above sea level

The tunnelling method of quarrying, while akin to coal mining, is on a much larger scale. Generally the way down to the workings or levels is by an incline with a gradient of about 1 in 2. At the Oakeley Quarry, Festiniog, the incline carries two sets of broad-gauge rails and reaches down to four "levels," each about 90 yds. below the other. A truck, of the type used on many lifts in the country, is carried on each set of rails and worked by gravity, a water ballast tank being fitted beneath each truck so that the slate-loaded vehicles can be brought to the surface. Much of the hauling in the quarry workings is done by gravity, but several electric haulages are in use.

When the level to be explored is reached, a roadway about 3 ft. wide by 5 ft. 6 in. high leads to a cavern of enormous dimensions where the slate is being quarried. Slate slabs of about 30 cwt. are the main object, but smaller ones are not scrapped. A small chamber, cut in the wall of one of the roads at the Oakeley Quarry, houses a distribution switchboard which controls power to the haulages and pumps. Water-pumping plant is usually the most extensive drive used at slate quarries. There are pumps of all sizes in use at the Llanberis Quarry of Messrs. W. Lloyd Williams, all of them driven by Mather & Platt motors.

An interesting example of modernisation is at a Llanberis quarry, where are the new design drawout circuit-breakers made by Messrs. George Ellison, Ltd., mounted on a slate-panel switchboard. The breakers, replacing switches and fuses, control the two sides of a 10-kVA, 525/364-V lighting transformer with the neutral point earthed. They were fitted to the slate panel on site during a week-end.

The slate-quarry workshops are usually driven by 25-h.p. motors, experience having shown this to be the most convenient size.

D

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

A Useful Kitchen Set

The "Supreme" culinaire is a new introduction by MESSRS. L. G. HAWKINS & CO., LTD., 30/35, Drury Lane, Kingsway, W.C.2, embodying in one neatly designed machine a beater, juice extractor, slicing and shredding plates, meat chopper, food grinder and mincer. For mixing, twin beaters are placed opposite each other in the bowl, and as they revolve the bowl itself rotates slowly. The three-speed motor and driving mechanism is in the base, and therefore no oil or grease can enter the mixing bowl; it also gives weight to the base and prevents the machine being tipped over easily. The price of the machine with mixing bowl, beaters and juicer is £6 10s. For a further £1 7s. 6d. a slicing plate and shredding plate (fine) with safety hopper and feeder can be obtained. The grinder, mincer and meat chopper cost £1 12s. 6d.

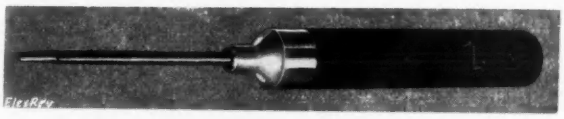
The "Supreme" culinaire

The "Glim" Tester

A new device marketed by DRAKE & GORHAM WHOLESALE, LTD., 77, Long Acre, W.C.2, is the "Glim" tester, which can be used on either a.c. or d.c. for testing circuits. It is priced at 3s. 6d., excluding lamps, and it is recommended that 15-W "pigmy" sign lamps be used owing to their small size and mechanical strength. It is possible to test the wiring of metal cord-grip holders, the earth connections to portable lamps, switch dollies, and to find out whether lengths of conduit and lead-covered cable are earthed or whether switches are on the wrong pole.

An Illuminated Screwdriver

Every householder, as well as every electrical contractor, has, at one time or another, to fix screws in a dark position. An electric torch is difficult to manipulate, and it is not always possible to use an extension lead from the mains supply. To get over these difficulties the BURGESS PRODUCTS CO., Barwell, Leicester, has introduced a screwdriver in the handle of which a 2.2-V flashlight bulb is incorporated.



The screwdriver flashlight

When a red milled nut at the opposite end is turned to the right, contact is made with the battery (two No. 4 "Unicells") inside the handle, and the area around the screwdriver blade is illuminated.

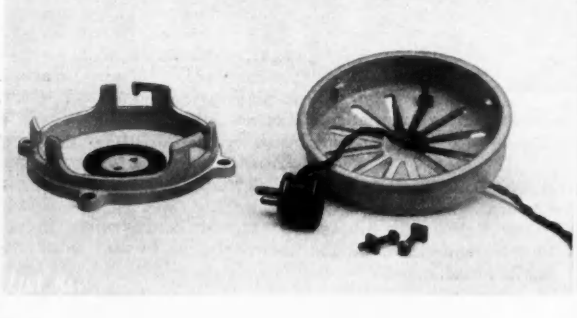
A Showroom Ceiling Box

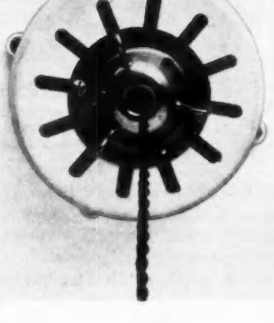
A showroom ceiling box has been designed by MR. E. G. NICHOLSON, secretary to the Woking Electric Supply Co., Ltd., Chobham Road, Woking, with a view to the easy fixing of fittings on the showroom ceiling and their ready removal from one position to another in the showroom without the necessity of fixing screws into the ceiling or hanging the fittings on unsightly rods, hooks or other devices.

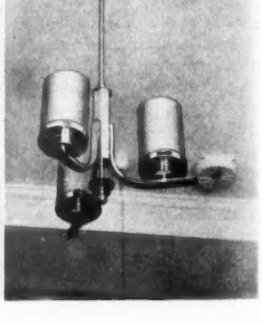
By means of the radial slots in the loose cover of the box any ceiling plate (whether it has two, three, four or more screw holes) may be quickly mounted on the box cover by means of metal stove screws and nuts, and after the plug top has been connected to the flex of the fitting, it is only necessary to insert the plug in the socket concealed in the box and couple up the cover of the box with the portion fixed permanently on the ceiling by engaging the three nibs with the three bayonet joints.

By uncoupling the bayonet fixing and withdrawing the plug the fitting may be taken down bodily and at once transferred to a new position. Since most showroom ceilings have at least a foundation of matchboarding, it will be observed that the permanent screw fixing holes are arranged outside the base with a view to obtaining as wide a spread for fixing as possible, in order to get a screw-hold into two or more neighbouring matchboards.

A box for the display of fittings in showrooms



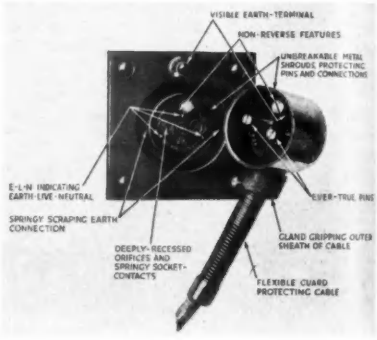




"Easigo" Plugs and Sockets

The new range of protected plugs and sockets produced by MESSRS. A. REYROLLE & CO., LTD., Hebburn-on-Tyne, has been designed with a view to securing smooth operation, compactness, a clean-cut appearance, ease of wiring, universal application, and unbreakability. The first size of the "Easigo" to be manufactured is marked "B.S.S. 196—5 amps." and "10 amps. max.," signifying that, while its dimensions comply with the accepted standards, it has a continuous current-carrying capacity of 10A, which it will break as a switch on a.c. circuits. Standard plugs are non-reversible.

The earthing pin previously provided with the open type of fitting has been replaced by an external shroud. The removable contacts and terminals of the sockets are now fitted separately on the ends of the wires and slipped into place like ordinary cable sockets to facilitate wiring in corners. Stiffness or bad contact is prevented by the springiness of the main and scraping earth contacts; deformation is avoided by limiting the possible deflection of the contacts and by the outer casings taking the external mechanical stress off the contacts. As in earlier patterns, the springs are slotted to maintain interchangeability with existing B.S.S. sockets, but the "ever-true" tips prevent the saw cuts from taking a permanent set-in beyond the parallel position, giving the equivalent of solid pins with springy contacts and of split pins with solid contacts.



The "Easigo" plug

The use of simple earthing terminals and external fixing lugs, suitable for any kind of screw, enables the sockets to be mounted on standard wood or metal bases; connections can be made without slack on the wires. The pliable glands fitted to the plugs make a water-tight joint with the outer sheathing of the cable. The position of the earth terminal on the plugs has been altered to make the casing moisture- and dirt-proof.

Neat flush fittings with square plates to fit standard boxes or for direct mounting and as easily wired as the surface type are included in the new range. The plugs and sockets form a weather-proof combination without screw-on rings.

Useful Cooking Accessories

We have received from MESSRS. CLARKES (REDDITCH), LTD., Sinew Works, Redditch, a sample of their "Kooksandee" oven tongs for lifting hot dishes (price 9d.)—a very serviceable device. They also send four samples of their "Gienic" easily adjusted food covers.

Next Year? By E. J. Jennings, F.C.I.S., Companion I.E.E.

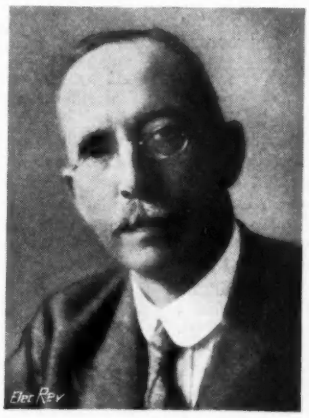
The case for a National Electrical Convention

THE desirability and practicability of organising a National Convention for the whole of the electrical industry has been raised from time to time, and in July, 1932, active measures were taken with a view to the question being thoroughly explored and pressed to conclusion. Next week's important I.M.E.A. Convention affords a suitable opportunity to place on record afresh a statement of the case and of the present position of the project.

As an *industry* we cannot claim to be organised, although sectional interests are to a large extent efficiently catered for. I think it is true to say, however, that the spirit of co-operation in our industry between certain sections is stronger to-day than it was but a few years ago, although we are still far from that degree of unity that seems to me to be so desirable and possible. The coming into being of the Central Electricity Board with its national grid has broken down the barriers between the municipal and company supply interests, and opened up a new era which makes possible and necessary a larger measure of co-operation all round if the full benefits of the national organisation of generation are to be secured.

The old constitution of E.D.A. brought all sections of the industry together for joint publicity efforts, apart from which it was good to meet round the table at regular intervals and get to appreciate each other's viewpoints. That no longer obtains at the moment, though it is much to be hoped that both nationally and in the areas co-operation committees will shortly come into being. Even so, these bodies will only deal with propaganda efforts, although, as indicated already, the mere act of meeting together is helpful in other directions.

We have a surprisingly large number of organisations catering for sectional interests in the electrical industry; they can be divided into five groups:—(a) Technical and professional; (b) manufacturers; (c) wholesalers; (d) contractors and retailers; (e) supply authorities. The question to be considered is, what effectual means can be devised for establishing contacts and for bringing these interests together from time to time to consider matters of common interest, or of interest to two or more sections. The answer seems to me to be, that one way is to hold a National Electrical Convention, possibly every three years, embracing all sections of our great industry.



[Lafayette

Mr. E. J. Jennings is secretary and commercial manager of the Birmingham Corporation Electric Supply Department

A Task for E.D.A.

If this can be successfully organised, it should, with the assistance of our national leaders and of skilled agents, be extremely valuable from the publicity point of view, and I can visualise in such an event electrical matters dominating the national Press of the country whilst such a convention is in session. For this reason it would seem to be E.D.A.'s prerogative to take the initiative, and endeavour to carry the matter to successful issue.

In July, 1932, the E.D.A. Council instructed its General Purposes Committee to consider the matter. That Committee eventually reported favourably, and the Council decided to invite all the associations within the industry to send delegates to a conference. The invitation was accepted by all, and the conference took place in June, 1933, when it was my privilege to state the case for a National Convention. After a full discussion a small sub-committee was appointed by the conference "to explore the possibility of arranging a National Convention at an early date and to report back."

The conference met again in July, 1933, and received the sub-committee's report, which, after pointing out that the members had no mandate to commit their associations, made valuable suggestions in favour of an attempt to organise such a convention in 1934, on lines which they considered would be suitable to achieve the object in view. The report suggested, *inter alia*, that the detailed organisation should be placed in the hands of the secretaries of the three associations, who had had practical experience of similar work, assisted if found necessary by a general convention secretary and directed by a small executive committee.

The conference adopted its sub-committee's report, and decided to forward it to all the associations represented for ratification or comment. This was a very important decision in view of the fact that no fewer than twelve bodies were represented, but by reason of the fact that so large a number of interests were concerned, it necessarily took time to obtain the views of all, and it became apparent as time went on that there were too many difficulties in the way to make it possible for such a convention to be held in 1934. It is of interest here to note that none of the associations rejected the project, that eight of them were more or less enthusiastically favourable, and that only one or two were non-committal.

Where Stands the I.M.E.A.?

I think it will be generally agreed that the supply side is the key to the position, and that the need for close collaboration between it and the rest of the industry cannot be emphasised too strongly. The company supply interests are favourable, and through their associations are prepared to participate in an all-in convention. At the present time the only convention connected with the supply side is that of the I.M.E.A., and indeed this is the dominant annual event of its kind. The views of the I.M.E.A. are therefore of the utmost importance.

I should imagine that the Council of the I.M.E.A. would welcome a national all-in convention, not annually, but at intervals of possibly three or five years, provided always that it did not in any way impair the value of its own convention, which occupies such an established position to-day in the scheme of things. I have attended the I.M.E.A. Conventions for the past twenty years, and their success has been outstanding and progressive. We can all agree that nothing should be done that would impair such success for the future in any way.

As I see it, an all-in convention should, in the natural order of things, be an enlarged I.M.E.A. Convention, with added prestige and value, with the president of that Association for the time being acting as president of the National Convention, and the presidents of all the other associations as vice-presidents. In other words, it should include in the year it is held the annual conventions of the I.M.E.A. and the E.C.A. and the summer meeting of the I.E.E., and should embrace all the other branches of the industry. It could occupy a full week at least and include open meetings; one private sectional meeting for any association that desired to have one for its own domestic affairs; four inter-sectional meetings grouped, for instance, as follows:—(*a*) Supply associations—municipal and company; (*b*) supply and contractors; (*c*) supply and manufacturers; and (*d*) manufacturers and contractors.

In this way sectional differences or grievances where they exist could be discussed, difficulties grappled with and smoothed out, and remedies taken in hand with a view to full steam ahead on the distribution side. In this way lies success and yet more success to the industry as a whole, and, what is more important, the quickening of the movement towards complete industrial and domestic electrification to the benefit of the community.

The Next Steps

The conference met again in January last, and a suggested programme, date and venue for such an event for 1935 are now being explored by a sub-committee. It is much to be hoped that a final conclusion will be reached within the next month or two, in order that the National Convention may become a *fait accompli* in 1935.

It may be asked where can such a big convention be held? It could be held in London, of course, but there is a general feeling that this would be unwise owing to the difficulty of keeping the delegates together. There are at least half a dozen suitable towns—Bournemouth and Brighton, to mention only two—where the accommodation and meeting facilities are ample for a convention of, say, 3,000 delegates.

In view of the decision to alter the date of the British Industries Fair—Electrical Section—to the last twelve days of May, 1935, it would seem to be desirable, if the scheme for a National Electrical Convention materialises for 1935, to make the date not earlier than the second or third week in June.

Industrial Leadership

The annual conference of the Textile Institute is being held at Grange-over-Sands this week. Included in the proceedings is the Mather Lecture, which this year is by Mr. A. P. Young, O.B.E., whose subject is "Industrial Leadership." Mr. Young contributes an article on "Electric Machine Tools" to this issue of the ELECTRICAL REVIEW.

The B.E.A.M.A. Dinner

OVER 700 people were present at the annual dinner of the British Electrical & Allied Manufacturers' Association held at the Connaught Rooms, London, W.C., on Thursday last week. Lord Derby, K.G., the president, occupied the chair and there were many distinguished guests.

The first toast was "Co-operation in Industry," and in proposing it Mr. M. J. Railing, chairman of the Council, divided the past years into three stages—the pre-war stage when unbridled individualism was rife; the war period when it was demonstrated how scientists, inventors and engineers could work in harmony for the common good; and the post-war years during which a system of co-operation had been built up in this country which had proved itself by standing the test of difficult times more successfully than had any organisation in other industrial countries. In the movement B.E.A.M.A. could claim to have played a considerable part.

The Government had given industry measures of protection to counter the dumping of other competitive countries, and it seemed to him that the time had come for industry to take measures for its protection from within. Efficiency and stability were inseparable from the question of remunerative prices. The return received by manufacturers of electrical machinery was entirely incommensurate with the technical skill involved in its design and construction and with the financial and other risks that had to be faced. No industry at the "starvation point" could be as great an asset to the country as it should be. Inadequate remuneration meant inadequate funds for research and standardisation, and was a hindrance to progress. While "rings" might be condemned, price arrangements could effect great improvement in service and quality, to the advantage of the consumer.

Control and Co-ordination

To-day there were many restrictions on export trade and there was no better organisation than B.E.A.M.A. to advise the Government in the shaping of a policy to meet the situation. Proof of the Association's value was provided by the fact that it had been cited by other countries as an example of what could be achieved by co-operation on a voluntary basis. Many countries had been compelled by the immense growth of productive capacity to institute some form of control. Many British national services had been organised and co-ordinated, but such control would have grave disadvantages if applied to manufacturing activity. Nevertheless, if industry did not set its own house in order, it might have organisation and reconstruction forced on it from outside.

They must endeavour to find a middle course, and it would be found that competing interests could work together in the cause of the nation's prosperity. As an example he quoted the instance of railway electrification. The manufacturers of electrical apparatus indicated that they were prepared to pool their resources in designs, patents, production, and other matters if the railway companies, also acting collectively, would state their needs definitely.

Mr. Railing sounded a warning against over-investment and suggested that a central organisation such as B.E.A.M.A. could perform a valuable service to the country by acting as a "clearing house," to which the leaders of finance could go for consultation and mutual advice. In conclusion, the speaker referred to the relations of the Association with the Government, and asked those in authority to recognise its immense value as a national asset.

The response was by Dr. E. L. Burgin, Parliamentary Secretary to the Board of Trade. He said that his department welcomed B.E.A.M.A. as it always found the Association's deputations well-informed and very helpful. He asked them not to look on the Board as an organisation in restraint of trade; its duty was not so much to regulate as to foster trade. He appealed to the electrical manufacturers to take the Board into their confidence and present all the facts well in advance of any action which the Government might be taking.

The Grid and the Railways

Lord Weir, of Eastwood, proposed the health of the guests. After appealing for co-operation with the Government, he referred to the grid for which he claimed some parental responsibility. He said that it was the first and by far the greatest example of the complete planning of a national utility service in any great country in the world. It was not socialism or any other "ism" but a healthy example of Great Britain's commonsense evolutionary method of dealing with major problems on a sane constitutional basis. He made reference to the valuable work done by Sir John Snell, and said that the British electrical industry, faced with the great problems presented by the grid, had provided a most successful solution. The grid had placed the industry in the very front rank with regard to work of this character, and had strengthened its ability to deal with the most advanced foreign demand. He spoke with approval of the great electrification schemes carried out by the Southern Railway and expressed the opinion that electrification would ultimately yield better results than steam to the British railway companies.

Lt.-Col. D. J. Colville, Parliamentary Secretary, Department of Overseas Trade, who replied to the toast, stated that he knew of no other industry that was making greater efforts to recapture overseas trade than the electrical industry. He pointed to the importance of the Empire as a market; during last year 56 per cent. of our electrical exports went to Empire countries. After a reference to the work on the Export Credits Guarantee Department, and to recent contracts received from Poland (of which there were more to come), the speaker said that no association was responsible for interests more vital than those represented by B.E.A.M.A., and he wished it the greatest prosperity.

Sir John Brooke, vice-chairman of the Electricity Commission, who also responded, maintained that Great Britain had the best electrical manufacturers in the world and the best supply industry. The latter was creating monthly records and was connecting 600,000 consumers a year. The aim was to cater for the working classes whose means were limited. To give these people full electrical service demanded the close co-operation of the manufacturers and the supply industry. It had to be borne in mind, however, that quality could not be deteriorated without imperilling the safety of the service.

Mr. John Taylor, C.B.E., proposed the chairman's health and Lord Derby responded.

New Books

Alternating Currents. By A. E. CLAYTON. Second Edition. Pp. 340; figs. 285. London: Longmans, Green & Co. Price 10s. 6d.

The second edition of Dr. Clayton's book contains a considerable quantity of new material. It is intended to cover the main requirements in a.c. work of students reading for a pass degree or for a Higher National Certificate, and this intention is carried out so far as circuit work and machine work are concerned. The author has, however, not included work on measuring instruments, and the material concerning power transmission is limited.

Since the book contains the first principles of a.c. work it is likely to be used also by students preparing for an Ordinary National Certificate, though one difficulty arises in this respect. As is usual with the work of this writer, the various subjects are treated in considerable detail and with great precision, and unless some guidance is received the more elementary students may be at a loss to know which are the less essential parts that may be omitted on a first reading. We would suggest that in the next edition some indication should be given of the parts which are essential for the preparation for a lower certificate, thus preventing time being taken up with points which are not, for the moment, of prime importance.

Considerable use is made of locus diagrams and of the symbolic method, and the inclusion on a large scale of the last-named method of working is to be greatly commended. The value of this method has recently been tested by arranging for a class to work a transmission line example involving the necessity of taking into account a concentrated line capacitance. One half of the students were required to use the symbolic method, while the other half were asked to use the ordinary trigonometrical method; students using the symbolic method finished the example in less time and with greater accuracy than those using the trigonometrical method. In spite of the numerous formulæ, many of which present difficulties to the printer, the book contains few errors and misprints, but it is noticeable in a few instances that the author does not systematically use the names recommended in the British Standard Glossary of electrical terms. The illustrations are all useful, consisting chiefly of vector and circuit diagrams, and the book concludes with a set of varied examples to which answers are given.

The volume can be unreservedly recommended not only to students preparing for the examinations previously indicated, but also to those engineers engaged in practical work who desire to obtain more detailed information concerning the theoretical aspects of a.c. than is commonly available in text-books.

Power Factor Correction. By A. E. CLAYTON. Second Edition. Pp. 128; figs. 45. London: Sir I. Pitman & Sons, Ltd. Price 2s. 6d.

The second edition of Dr. Clayton's excellent little handbook on power factor correction has been revised and amplified.

The original work dealt with the causes of low-power factor, the economies of power-factor correction, and the application of static condensers, synchronous motors, and phase advancers; the additional chapters in the present edition deal with synchronous-induction motors and with three-phase commutator motors. The book gives a lucid and concise review of the whole subject of power-factor correction, and will be as acceptable as ever to the student and to the power-plant engineer. Dr. Clayton has not laid sufficient stress on the possibilities of the avoidance of low-power factor by a choice of suitable ratings of induction motors for industrial drive; many cases of inordinately low-power factor are due to the provision of excessive overload capacity.

The author has rightly included academic theory, but the meaning and measurement of power factor is dealt with a little superficially. The only method referred to is the use of a power-factor meter, while from the reference to three-phase circuits it might be inferred that, in practice, all such circuits were accurately balanced. Again, in considering an example of a power-factor tariff in which a rebate is given for each 0.01 by which the power factor exceeds 0.85, no explanation is given of what power factor means in this connection, or how it can be measured. The sole reference to special meters used for power-factor tariffs is to that due to Arno, a type which has never been used in this country.

Machines Automatiques: Mécaniques et Electriques. By P. MAURER. Pp. 185; figs. 42. Paris: Librairie Armand Colin. Price: 10fr. 50.

This remarkable little volume is very reminiscent of Gore's classic "Art of Scientific Discovery," for, as that monumental work analysed and classified the methods by which discovery and invention may be attained, so the book before us demonstrates on a less ambitious scale the evolution of machines and the principles of mechanisation. The author is to be congratulated on dealing clearly and usefully with so vast a subject in such small space, and the book can be recommended not merely to the general reader who desires a systematic outline of machines and their capabilities, but also as an admirable introduction to the serious study of machine design.

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Shorter Notices

"Television—To-day and To-morrow," by S. A. Moseley and H. J. Barton Chapple. Pp. 205; figs. 56. London: Sir Isaac Pitman & Sons, Ltd. Price 7s. 6d.

"Power Supply Economics," by J. D. Justin & W. G. Mervine. Pp. 291; figs. 58. London: Chapman & Hall, Ltd. Price 21s. 6d.

"Fundamentals of Industrial Administration," by E. T. Elbourne, M.B.E. (Pp. 644.) London: Macdonald & Evans. Price 12s. 6d. net.

"Design of Alternating-Current Machines," by Kenneth Aston, B.Sc.Tech., A.M.I.E.E. (Pp. 365; figs. 202.) London: Oxford University Press (Humphrey Milford). Price 16s. net.

"Centrifugal Pumps, Turbines and Propellers—Basic Theory and Characteristics," by W. Spannhake. (Pp. 328; illus. 182.) Cambridge (Massachusetts): Massachusetts Institute of Technology. Price $5.

"The Atom," by J. Tutin. Pp. 110. London: Longmans, Green & Co., Ltd. Price 6s.

Parliamentary News (BY OUR SPECIAL REPORTER)

A SELECT Committee of the House of Commons began the consideration on May 15th of the London Passenger Transport Board's Bill. Mr. Annesley Somerville presided. Over fifty of the petitions originally deposited against the Bill had been withdrawn, and of the twenty-two opponents remaining only twelve were represented by counsel.

Mr. Tyldesley Jones, K.C. (appearing with Mr. Craig Henderson, K.C., and Mr. J. H. Thorpe for the Board) said that the opposition was chiefly directed against particular routes on which it was proposed to run railless trolley vehicles. The greatest opposition was in relation to the proposal to run trolley vehicles down Tottenham Court Road, using Bedford Square as a turning place. That was opposed by property owners on the ground of interference with amenities, and by the Holborn Borough Council, who said it would adversely affect rateable values, while the Commissioner of Police, who favoured trolley vehicles generally, said that they would interfere with the flow of traffic if they went to the south end of Tottenham Court Road.

Mr. Frank Pick, giving evidence in support of the Bill, said that as two tramcars equalled in passenger carrying capacity three buses, it was obviously desirable to retain them. The only alternative way of relieving congestion in the streets, that of underground railways, was very expensive. It was cheaper to run an electric tramcar than a petrol bus. The loss on the tramway system could not be regarded as permanent. The Board having the opportunity of reviewing the system as a whole and dealing with parts of it by this Bill contemplated making the tramway system not only self-supporting but a contributor in proper measure to the financial resources of the Board. They could not consider scrapping the trams.

Trolley vehicles formed a flexible unit of street transport, they were safe because they could draw up to the kerb, and they were quiet, speedy and comfortable. Moreover, their operation was economic because of the relatively more stable cost of electricity than petrol; their adoption obviated the necessity of scrapping existing electrical equipment, and they helped to maintain a good load on the Board's generating station. The Board proposed to run them on 85 miles of route.

Continuing his evidence on May 16th, Mr. Pick said that the ordinary trolley vehicle now used in the Wimbledon-Kingston-Twickenham district had a seating capacity of 56, but they had one experimental vehicle running which provided 73 seats and had proved completely satisfactory. Another vehicle was being built which he hoped would be delivered on June 1st which would seat 74 passengers and would give greater comfort and convenience. If trolley buses were to replace tramways over a large area that would necessitate running the larger type of trolley vehicle.

Cross-examined by Mr. F. J. Wrottesley, K.C., who appeared for several petitioners, Mr. Pick agreed that if trolley vehicles replaced tramways the Board, after paying the cost of reinstatement of the roadway, would be relieved of the present obligation of road maintenance. The trolley vehicles would, however, pay the licence duty which went into the Road Fund.

In reply to other questions Mr. Pick said he hoped that this was the first of two or three programmes for clearing up the tramway situation.

Mr. Pick's cross-examination was resumed on May 17th. In reply to Mr. Macaskie, K.C., for the Holborn Borough Council, he said that an effort would be made to use the present lighting standards in Tottenham Court Road to carry the trolley vehicle equipment. That matter and other details could be easily settled by negotiation if there was good will on both sides.

Replying to Mr. Beresford, counsel for occupiers in Bedford Square, Mr. Pick said that the trolley vehicles used there would be an improvement on those running in the Kingston area. No one would suggest that trolley buses should be noiseless but experiments had already been made to eliminate noise.

The Y.E.P. Opposes a Gas Bill

The Sheffield Gas Bill which came under the consideration of a Select Committee of the House of Lords presided over by Lord Amulree last week was opposed by the Yorkshire Electric Power Co. By this Bill the Sheffield Gas Co. seeks power to prevent any other person or body supplying coke-oven gas in its area.

Mr. R. Halkett, general manager of the company, answering questions by Mr. Craig Henderson, K.C., who appeared for the Power Co., declared that it would not be advantageous to the Power Co. to erect a generating station in the Sheffield area and that it was unlikely that the Electricity Commissioners would give their consent to it. At present the Power Co. did not come into the gas company's area except to a small extent. He agreed that, within the company's limits, if the Power Co. found it advantageous to use coke-oven gas, the only source of supply would be the Gas Company. He also agreed that the Gas Company's price would not suit the Power Co., and that was why it would be far better to bring the coke-oven gas into Sheffield than to use it for generating electricity. He said that electricity could not compete with gas in industry. Mr. Henderson pointed out that one of the most modern developments was the use of the electric furnace, but the witness maintained that this played only a very small part in the steel industry.

After hearing speeches from counsel the Committee deferred its decision and adjourned until June 5th.

The Electricity (Supply) Bill

In the House of Lords on May 17th Lord Plymouth formally moved the third reading of the Electricity (Supply) Bill.

Lord Elibank said that he would like to reiterate on behalf of the supply companies that they did not like the principle contained in the Bill, and that they regretted that the principle which was laid down in the Act of 1926, that the Central Electricity Board should not supply direct to the railway companies, had been reversed. They had at least managed to secure that there should be appeal in nearly all instances to the Electricity Commissioners on actions that might be taken by the Central Board. There were one or two amendments which the Government had not accepted but would, he hoped, receive consideration in the House of Commons. He trusted that the Board and the railway companies would not regard the Bill as a charter for the indiscriminate electrification of the railways of the country.

The policy of wholesale electrification of the railways should not be carried through by way of a small and disingenuous Bill, as this appeared to be, and he hoped, therefore, that the Minister of Transport would keep a watchful eye on this matter and see that this Bill was not used for purposes other than those for which it had been passed.

The third reading was agreed to.

The North Wales Electric Power Bill

This Bill passed its third reading in the House of Lords on May 8th and was read a first time in the House of Commons the same day.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The Contractors' Conference

We have now received a copy of the official programme of the ninth annual conference of the E.C.A. Allied Associations, which will be held at Buxton from June 27th-29th. The Council of the three Associations (E.C.A., N.E.C.T.A., and the N.F.E.A.) will meet on the morning of the first day at the Town Hall, and in the evening the president will receive the delegates at the Palace Hotel. On Thursday morning there will be a civic welcome by the Mayor of Buxton (Coun. J. H. Smythe) at the Opera House, which will be followed by the presidential address by Mr. J. Orringe, and an address by Sir William Ray. In the afternoon the conference will re-assemble at the Opera House for a general discussion of matters raised by Sir William Ray, and current trading problems, and in the evening there will be a smoking concert at the Palace Hotel. The annual general meeting will be held on Friday morning, and will be followed by the installation of the new president, who will give a short address. The afternoon will be taken up with a drive to Bakewell and tea at the works of the D. P. Battery Co., at the invitation of Mr. H. M. Drake, the conference concluding in the evening with a ball and supper at the Spa Hotel. For those wishing to stay in Buxton over the week-end arrangements have been made for golf, drives, and other entertainment. Members are, of course, invited to take their ladies with them, as in previous years. At the invitation of the Buxton Corporation delegates will be given complimentary use of the bathing pools at the natural baths and half-price facilities for any other treatments at the thermal and natural baths.

The Plymouth Electrical Exhibition

That electricity was becoming cheaper and that they had entered upon a two-part tariff at a low price from which he hoped increased sales would result were statements made by Ald. W. J. Modley, chairman of the Plymouth Corporation Electricity Committee, at an electrical exhibition and cooking demonstration which took place last week at the Abbey Hall. The Mayor (Mr. E. S. Leatherby) congratulated the Electricity Department and the Electrical Association for Women on their enterprise in co-operating in organising the exhibition. Speaking on behalf of the E.A.W., Mrs. C. H. Daymond (chairman) said that the Association was trying to get electrical appliances into the home of every woman in the city of Plymouth. Mrs. H. Palmer, of Bognor, gave daily cooking demonstrations, and other demonstrations included water heating, washing, ironing, and carpet cleaning.

The E.A.W. stand at the Plymouth Exhibition

Illumination of Open Air Baths

The Hornsey open air baths have recently been equipped with a complete system of Holophane lighting. This comprises floodlighting of the main bath, which measures 165 ft. by 75 ft. "H.F. 1,000" extensive type floodlights are used with 1,000-W lamps, and special poles at a height of 18 ft. from the ground. The sun-bathing terraces and promenade are floodlighted by Holophane "FL.500E" and "FL.200E" type projectors. A pleasing effect is obtained by floodlighting the ornamental gardens and aerator fountain by various coloured flood units. There is accommodation for 631 bathers. The dressing boxes are lighted by Holophane "Widerlite" bulkhead units, specially adapted for close ceiling mounting owing to the low height available. The scheme was prepared by Holophane, Ltd., and carried out by the Hornsey Electricity Department to the instructions of the borough electrical engineer, Mr. C. N. Staniland.

The open-air baths and gardens at Hornsey illuminated by means of Holophane floodlights

The Exide Convention

The annual Exide Battery Convention will be held this year at Scarborough from June 12th to 14th. The headquarters of the Convention will be at the Royal Hotel, and the delegates will include representatives from Australia, South Africa, India, Germany, France, Holland and Belgium.

Trade Commissioner's Visit

The Department of Overseas Trade announces that Mr. F. W. Field, H.M. Senior Trade Commissioner in Canada, is to pay an official visit to this country, and will be available at the Department's offices from June 5th to 12th for the purpose of interviewing manufacturers and merchants interested in the export of United Kingdom goods to Canada, after which he will visit a number of industrial centres in the provinces. Firms desiring interviews in London or information regarding Mr. Field's visit to the provinces should apply to the Department at 35, Old Queen Street, S.W., quoting reference 11952/1934.

Recent Contracts

Sir W. G. Armstrong Whitworth and Co., Ltd., have received a contract from the Madras and Southern Mahratta Railway for the supply of six oil-electric double bogie railcar chassis fitted with 135 h.p. Armstrong-Saurer engines.

Steatite & Porcelain Products, Ltd., has obtained an order for the supply of a further 8,200 spring ring insulator units for extensions to the 88-kV lines of the Victoria Falls and Transvaal Power Co., Ltd. This order brings the number of these units supplied to the Victoria Falls Power Co. to over 40,000.

The English Electric Co., Ltd., has received an order from the Central Electricity Board for two 20,000-kVA transformers for installation at Bury. These units will operate on the 33-kV secondary transmission system and will be coupled with on-load tap-changing equipment. A feature of interest is that the full output of 20,000 kVA will be obtainable by means of natural cooling. The company has also received an order from the Victoria Falls and Transvaal Power Co. for a 45,000-

kVA bank of transformers. These will be used to couple together a 42,000-V and a 21,000-V systems. On-load tap-changing gear will be provided to give a wide range of voltage regulation on the 42,000-V side. The transformers will have a separate forced cooling system.

An order has been placed by the Transport Department of the Glasgow Corporation with the General Electric Co., Ltd., covering eighty-five sets of tramcar electrical equipment. A total of 170 "Witton" tramway motors are involved, each equipment consisting of two 60-h.p. self-ventilated tramway motors of the interpole type, together with a set of grid resistances and two tramcar type circuit-breakers. The whole of this equipment, which constitutes a repeat order following the supply of 450 similar motors in 1930, will be manufactured in the Traction Department of the Witton Engineering Works of the company.

The Westinghouse Brake & Saxby Signal Co., Ltd., has also received an order from the Glasgow Corporation Transport Department for the supply of 131 sets of complete air-brake equipment for the trams. These sets will include the new and improved self-lapping brake valve.

For Sale

Southampton Corporation has for sale a 1,000-kW steam turbine.

(See our classified advertisements.)

Cement Production

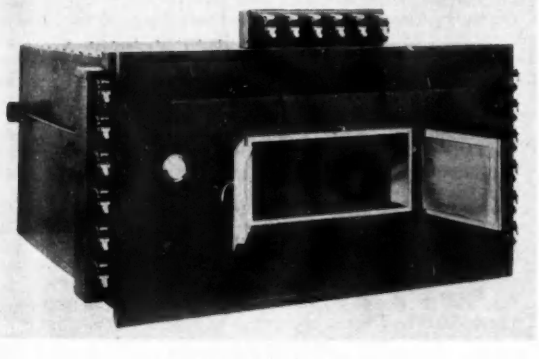
In this article which appeared in our last issue it was stated that the transformers at the works were made by the Electric Construction Co. The Hackbridge Electric Construction Co., Ltd., point out that these transformers were made by them.

The Batti-Wallahs' Society

The next luncheon of the Batti-Wallahs' Society will be held at the Hotel Metropole, W.C., on June 6th, when the chief guest will be Mr. H. E. Metcalf, who will give an address on trade with Russia.

Encouraging Electric Baking

The Arora Co., Loughborough, is circularising central station engineers with a photograph, reproduced herewith, and particulars of a typical electric baking installation. The letter ends with a request for information regarding the best rate which the company can offer. A quarter-sack peel type oven has recently been installed as a test in the flour mills of one of the most prominent milling companies in the country. The baking space is 4 ft. square and the loading 10.3 kW, with suitable control switches and thermometer. Such ovens can be arranged to operate on any existing platform or can be supplied with a steel stand. They are heavily lagged, the drop in temperature when all switches are off for a period of three hours being only one degree per minute and the heating-up time approximately one hour. The ovens are designed to give uniform baking by means of the even application of heat from iron armoured heating elements running from back to front at the top, and from back to front under the soleplate at the bottom.



An Arora baker's oven

Wages in the Cable-making Industry

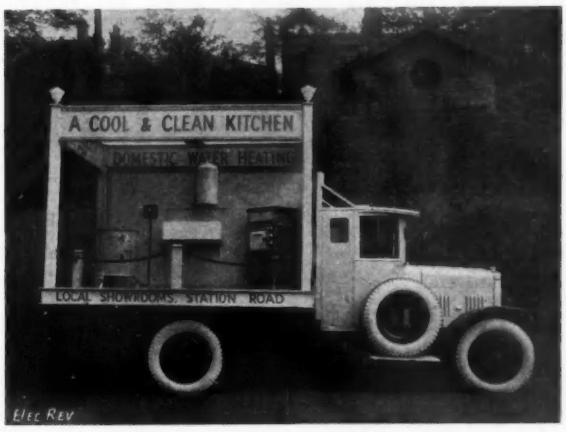
We are informed by the Joint Industrial Council for the Electrical Cable-making Industry that the fall in the cost of living justifies a decrease in wages in the industry as from the third pay-day in June for the period covered by that pay-day. The reductions will restore the figures to those in force up to the second pay-day in August last, and amount to about 2s. a week for male timeworkers, 1s. 6d. for youths and boys under twenty-one years of age, 1s. for female workers eighteen years of age and over, and 6d. for those under eighteen.

Works Visit

Members of the Electrical Association for Women, with Miss V. Norvick in charge, visited the Gravesend works of W. T. Henley's Telegraph Works Co., Ltd., on May 8th. The party, which was accompanied by the Countess of Darnley and Mrs. Morris, Mayoress of Gravesend, showed great interest in the various manufacturing processes. Luncheon and tea were provided by the company, to whom Mrs. Morris proposed a vote of thanks after the tour of the factories.

A Birmingham Tableau

At the Solihull Carnival which was held during the week ended May 12th, the Birmingham Corporation Electric Supply Department entered a vehicle in the procession. The demonstration van, shown in the accompanying illustration, on one side had an electric fire, and on the other a water heater, electric cooker, &c. One of the features of the week was the floodlighting of the historic Parish Church of St. Alphege, while the department arranged a special display at its branch showroom.



An electrical tableau in the Solihull carnival

New Television Merger

A new company has been registered under the name Marconi-E.M.I. Television Co., Ltd. The shares are held equally by the Marconi Co., and Electric & Musical Industries, Ltd. The new company is the result of an agreement between these companies to form a television merger on an equal basis. The agreement relates to high definition television. The board of the new company will include the Marchese Marconi, Lord Inverforth (chairman of the Marconi Co.), Mr. Alfred Clark (chairman of E.M.I.), and the managing directors of the Marconi Co. and E.M.I. respectively. Lord Inverforth will be chairman of the company.

Swansea Cable Contracts

Allegations were made at a recent meeting of the Swansea Corporation that the prices of cable purchased from "ring" manufacturers were considerably higher than prices quoted by non-ring manufacturers, and it was proposed that the minute of the Electricity Committee accepting tenders for h.p. and l.p. cable for twelve months, and that the borough electrical engineer be authorised to secure cable from non-association firms for testing purposes be referred back. The amendment was lost and the minute approved.

A Prize Carnival Car

The accompanying illustration shows a carnival vehicle representing an electric kitchen which the Lancashire Electric Power Co. entered in the trade section of the Croston Carnival held on May 12th. This display was awarded the first prize, together with a silver cup, which is held for twelve months.

A CROSTON ELECTRIC KITCHEN
A CROSTON ELECTRIC KITCHEN
DON'T LIGHT A FIRE IN SUMMER MONTHS.
ELECTRICITY IS BEST
THE WIZARD IN THE WALL
LANCASHIRE ELECTRIC POWER CO. LTD.
ELEC REV

The Lancashire Power Co.'s winning carnival car

Radio Apparatus in Belgium

The works of the Belgian subsidiary of the Philips Company of Eindhoven—the Usines Philips Belge of Liège—which was closed last year, has been reopened for the manufacture of

radio apparatus and parts. The re-starting of the works is due to the recent increase in the import duties on radio apparatus in Belgium.

A Fire Brigade's Success

The Fire Brigade at the Woolwich works of Standard Telephones & Cables, Ltd., has been successful in obtaining the Corporation of London's challenge shield. This is a record, as Woolwich has now won the shield two years in succession, and is the only team since the inception of the competition to carry out both drills without penalties. The Lord Mayor, Sir Charles Collett, handed the shield to the winners and distributed medals to the winning team and runners-up at the Guildhall on May 12th. A number of long service medals were also presented to members of the brigade.

Standard Telephones Brigade with the trophy

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

CHEMICALS, ETC.	Price, May 23rd	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19 15s.	—
a Potash Chlorate ... ... per lb.	3⅞d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£4 18s.	—
a Sulphur Commercial... ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3⅜d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. nett.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil... ... ,,	1/2 to 2/9	—
p Babbits Metal and Anti-friction Metals —		
Grade I ... ... per ton net	£208	£2 dec.
Grade II ... ... ,,	£142	£1 dec.
Grade III ... ... ,,	£68	—
c Brass (rolled metal 2" 10 12" basis)... per lb.	7d.	—
c ,, Tubes (solid drawn) ... ... ,,	9d. to 9¼d.	—
c ,, Wire, basis ... ... ,,	7¼d.	—
c Copper Tubes (solid drawn)... ... ,,	10d.	—
g ,, Bars (best selected)... ... per ton	£62	—
g ,, Sheet ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£35 15s.	10s. dec.
g ,, ,, Sheets ... ,,	£35 10s. to £36	5s. to 10s. inc.
d ,, ,, Wire Rods ... ,,	£42 10s.	—
d ,, ,, H.C. Wire ... per lb.	7¼d.	—
f Ebonite Rod ... ... ,,	1/3 to 1/6	—
f ,, Sheet ... ... ,,	1/3 to 1/6	—
n German Silver Wire ... ... ,,	2/5	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	6d.	—
i Iron, Pig (Cleveland No. 3)... ... per ton	62/6	—
i ,, Wire galv. No. 1, P.O. qual. ... ,,	£20	—
g Lead, English Pig ... ... ,,	£12 5s.	5s. dec.
g Mercury ... ... per bot.	£10 15s. to £11	—
c Mica (in original cases) small ... per lb.	6d. to 3/6	—
e ,, ,, medium ... ,,	4/- to 8/-	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, ,, drawn bars & rods ,,	11d.	—
p ,, ,, rolled strip & sheet ,,	11d.	—
p ,, ,, wire ... ... ,,	1/–	—
o Platinum ... ... per oz.	£7 15s.	—
d Silicium Bronze Wire ... ... per lb.	8 ⅘d.	—
r Steel, magnet, in bars ... ... ,,	7½d.	—
n Tin, Block (English)... ... ... per ton	£233 5s. to £235 5s.	£2 dec.
g ,, Wire, Nos. 1 to 16 ... ... per lb.	3/8	—

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
India-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
f W. R. Dennis & Co.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead and rubber, up to the time of going to press, are given in our "Business Notes" under the same heading.

German Radio Manufacturing Restrictions

In order to protect the existing makers of radio receiving apparatus from the establishment of new home concerns and to prevent foreign firms from establishing works in Germany, consequent on the lapse last year of the main Lieben patents, the German Government has published a decree which applies from the present date to the close of 1936. This forbids the establishment of new works or the extension of existing works for the construction of radio receivers and parts, especially valves; and makers of certain parts are prohibited from developing their business so as to include any other parts.

Employment During April

Employment in the engineering industry during April again showed an improvement, but was still slack on the whole. According to statistics published in the *Ministry of Labour Gazette* the number of unemployed totalled 143,699, a decrease of 11,667 as compared with the preceding month, the percentage falling from 16.3 to 15. (In April, 1933, the figure was 25.3.) In the electrical engineering section the number of unemployed was 8,763, the proportion falling slightly from 10.6 to 9.7 per cent. (18.4 per cent. in April, 1933). In the electric cable, apparatus and lamp manufacturing group the unemployed totalled 13,350, the percentage falling from 12.1 to 10.6 (18 per cent. in April, 1933), while the electrical wiring and contracting industry also showed a slight decrease at 4,362 from 16 to 15.8 per cent. (18.3 per cent. in April, 1933).

New Electricity Showrooms

The Dover Corporation's new electricity showrooms are to be opened to-day (Friday) by the Mayor, Councillor F. H. Morecroft.

National Display Convention

The National Display Convention, organised by the National Display Association, will be held from September 3rd to 5th at the Conway Hall, Red Lion Square, W.C. Modern lighting will play an important part in the display.

Trade Announcements

The Ateliers H. Cuenod, of Geneva, specialists in the Thury system of automatic regulators for generating plant and electric furnaces, and in power factor regulators and the automatic regulation of steam, air and gas, have appointed the Piggott Electrical Co., Ltd., Salisbury Square House, E.C.4, their selling agents in Great Britain.

Owing to the growth of business and the need for increased accommodation for their London office staff, Messrs. Crompton Parkinson, Ltd., have removed their offices from the north-east to the south-east wing of Bush House, Aldwych, W.C. The transfer took place during the Whitsun holidays, so that normal business was commenced on Tuesday morning last.

The Lamp and Meter Departments of the Glasgow Area of the Metropolitan-Vickers Electrical Co., Ltd., have removed to the company's main offices and stores at 74, Waterloo Street, Glasgow.

Messrs. Rhodes, Brydon & Youatt, Ltd., Waterloo Engineering Works, Gorsey Mount Street, Stockport, have been appointed the sole agents and distributors in Great Britain for Sihi self-priming water pumps, vacuum pumps and compressors.

Mr. G. R. Croskell, electrical dealer, has removed to 21 Rodney Street, Wigan.

New Catalogues and Lists

Electrical Equipment & Carbon Co., Ltd., 107/111, New Oxford Street, W.C.1.—Booklet on special fittings for overhead line transmission.

Sloan Electrical Co., Ltd., 8/12, Golden Lane, E.C.1.—Leaflet dealing with electric fans.

Electro-Dynamic Construction Co., Ltd., Devonshire Grove, S.E.15.—A catalogue of d.c. to a.c. convertors for operating neon signs, X-ray talking picture equipment, &c.

Electrical Leakage Detectors, Ltd., 68, Victoria Street, S.W.1.—A booklet on the company's detectors.

Herbert Terry & Sons, Ltd., Redditch.—A booklet dealing with flexible shafts.

Benjamin Electric, Ltd., Brantwood Works, Tariff Road, Tottenham, N.17.—Catalogue of "Densacone" water-heaters.

Ionic Alkaline Batteries, Ltd., 26, High Street, Stratford, E.15.—A leaflet on the "Ionic" handlamp.

British Rola Co., Ltd., Minerva Road, Park Royal, N.W.10.—list of loud speakers with technical data sheet and broadsheet.

D. H. Bonnella & Sons, Ltd., 46/48, Osnaburgh Street, N.W.1.—A catalogue of motor car electrical accessories.

Millns Electrical Co., 17, Whitefriars Street, E.C.4.—Booklet on "Mecvent" electrical organ blowers.

Ever-Ready Co. (Great Britain), Ltd., Hercules Place, Holloway, N.7.—A new export catalogue.

Electric Depôt, Ltd., Pritchett Street, Aston, Birmingham.—A leaflet on inspection handlamps.

Bankruptcy Proceedings

F. G. H. Rockall, trading as Rockall & Co., electrical engineers, 7-8, Ham Yard, Piccadilly, W.—The statutory first meeting of creditors was held on May 16th at London Bankruptcy Buildings. The debtor estimates his liabilities at £1,000 against assets and book debts of £150. He states that he began business in January, 1919, with two partners, but they retired. He continued alone until last March 19th, when he closed down on account of trade depression and bad debts. The case was left in the hands of the Official Receiver to be wound up in bankruptcy. The receiving order was made on May 3rd upon the petition of the General Electric Co., Ltd., creditors for £289.

E. H. Goldie, "Dunkerque," The Parade, Dudley, Worcestershire, formerly trading as the Dudley Radio and Electrical Service, Castle Street, Coseley, Staffs, radio engineer.—The public examination took place on May 17th at the Court House,

Dudley. The statement of affairs showed liabilities of £420 and a deficiency of £349. Debtor said that the greater portion of his business consisted of supplying radio sets to customers on hire-purchase terms. He was requested to file a cash account within twenty-one days, and the examination was adjourned.

C. T. Waterhouse, electrical engineer, 137, Smawthorne Lane, Castleford.—Public examination June 14th at the Court House, Wakefield.

M. Tinner (Yorkshire Trading Co.), electrical factor, 91, Porter Street, Hull.—Trustee, Mr. J. E. D. Stickney, 1, Parliament Street, Hull, Official Receiver, released April 25th.

H. W. Titmarsh, electrical engineer and wireless dealer, 23, Wisbech Road, Littleport.—Last day for receiving proofs for dividend May 29th. Trustee, Mr. J. L. Wilkinson, 41, Sidney Street, Cambridge, Official Receiver.

E. E. Lucas, radio and electrical engineer, 1A, Station Road, Plymouth.—First and final dividend of 1s. 4½d. in the £, payable May 23rd at 11, St. Aubyn Street, Devonport.

R. Robinson, electrical engineer, The Arcade, Waterfoot.—First and final dividend of 2s. 5½d. in the £, payable May 23rd, at the Official Receiver's office, Byrom Street, Manchester.

L. Wardleworth (L. & V. Wardleworth), radio and electrical engineer and contractor, 335, Bury Old Road, Prestwich.—First and final dividend of 7d. in the £, payable May 24th at the Official Receiver's office, Byrom Street, Manchester.

R. E. Baxter, electrician and wireless dealer, 77, Hackthorn Road, Sheffield.—First and final dividend of 7½d. in the £, payable May 18th at 14, Figtree Lane, Sheffield.

H. H. Edwards, electrical engineer, 26, Churchfields, Wellington, Somerset.—First and final dividend of 2s. 10d. in the £, payable May 23rd at Exeter Bank Chambers, Broadgate, Exeter.

H. Barker (Broadway Radio Stores), radio dealer, 848, Manchester Road, Bradford.—Receiving order made May 15th on debtor's own petition.

W. H. Secker (Modern Wireless Depôt), wireless engineer, 93, Magdalen Street, Norwich.—Receiving order made May 14th on debtor's own petition. First meeting May 25th at 4, Eastbourne Place, Prince of Wales Road, Norwich. Public examination June 12th at the Shirehall, Norwich.

J. H. Peacock, wireless dealer, Cornmarket, Pontefract.—Receiving order made May 14th on debtor's own petition.

T. Hughes-Davies, wireless engineer, Radio House, High Street, Llangeni, Anglesey.—Last day for receiving proofs for dividend, June 2nd. Trustee, Mr. A. Cripwell, 12, Cherry Street, Birmingham.

W. S. Handley and **G. Taylor** (Handley and Morgan), wireless dealers, 55, Lower Union Street, Bristol.—Last day for receiving proofs for dividend May 30th. Trustee, Mr. H. Wheeler, 26, Baldwin Street, Bristol, Official Receiver.

R. S. Wright, wireless dealer, 33, Broomfield Road, Coventry.—Last day for receiving proofs for dividend June 2nd. Trustee, Mr. C. J. Band, 9-11, High Street, Coventry, Official Receiver.

H. Bannister (H. Bannister & Co.), 43, Old Moat Lane, Withington, Manchester.—Second and final dividend of 1s. 4d. in the £1, payable June 1st at 20, Booth Street, Manchester.

A. Leach, radio dealer, 4, Market Street, Otley.—Receiving order made May 10th on debtor's own petition.

E. Whitehouse, electrical and radio engineer, 29, Westfield Street, St. Helens.—First and final dividend of 1s. 5½d. in the £, payable May 25th at 2, Bixteth Street, Liverpool.

T. E. Harvey, radio and electrical engineer, 64, Leagrave Road, Luton.—First and final dividend of 1s. 5½d. in the £, payable May 22nd, at the Official Receiver's office, The Parade, Northampton.

Company Liquidations

Radcells, Ltd., New Market, Beccles, radio and electrical engineers.—The statutory meeting of creditors was held recently at Beccles, when a statement of affairs was submitted showing liabilities of £453, all due to unsecured creditors and total assets of £112, leaving a deficiency of £341. A resolution was passed confirming the voluntary liquidation of the company with Mr. J. N. T. Cross, Beccles, as liquidator, with a committee of inspection.

Armoured Cable Co., Ltd.—Winding up voluntarily. Liquidator, Mr. J. Welby, 7-8, Lark Row, E.

Slough Radio Co., Ltd.—Meeting June 19th at 18, Mackenzie Street, Slough, to receive an account of the winding-up by the liquidator, Mr. H. C. E. Miller.

Tekade Radio & Electric, Ltd.—Meetings June 15th at 78, New Oxford Street, W.C., to receive an account of the winding-up by the liquidator, Mr. C. Latham.

George Wragge, Ltd.—Winding up voluntarily. Liquidator, Mr. J. Collier, 4, Chapel Walks, Manchester. Particulars of claims to the liquidator by June 16th.

Walter Withers & Son, Ltd.—Meetings, July 2nd, at 44, East Hill, Wandsworth, S.W., to receive an account of the winding-up by the liquidator, Mr. A. Hosking.

Private Arrangement

H. B. Smith, 63, Castle Street, High Wycombe, electrical engineer.—A meeting of creditors was held in London recently, when it was reported that the liabilities amounted to approximately £292, and the assets totalled £320. The creditors decided that the meeting should stand adjourned and that in the meantime the accountants should investigate the matter of debtor's interest in his late father's estate.

Dissolution of Partnership

Kennett & Sellon, electrical engineers, 96, Brighton Road, Worthing.—Messrs. J. C. Kennett and H. V. Sellon have dissolved partnership. Mr. Kennett will attend to debts and carry on the business.

India's Electrical Imports

ALTHOUGH the total imports of electrical goods and apparatus (including telegraph and telephone apparatus, but not machinery) during the period April 1st to December 31st, 1933, amounted to only Rs.162 lakhs as against Rs.174 lakhs in the corresponding period of 1932, it is satisfactory to discover that, thanks to the preferential duty, the United Kingdom's share increased from Rs.90 lakhs to Rs.93½ lakhs, whereas that of Germany shrank from Rs.27 lakhs to Rs.16 lakhs, the U.S.A. from Rs.19½ lakhs to Rs.15½ lakhs, and Japan from Rs.12 lakhs to Rs.11 lakhs. Arrivals from Holland, mainly lamps, rose from Rs.8¼ lakhs to Rs.9 lakhs, those from Belgium from Rs.2¼ lakhs to Rs.2¾ lakhs, and Italy from Rs.3 lakhs to Rs.3½ lakhs.

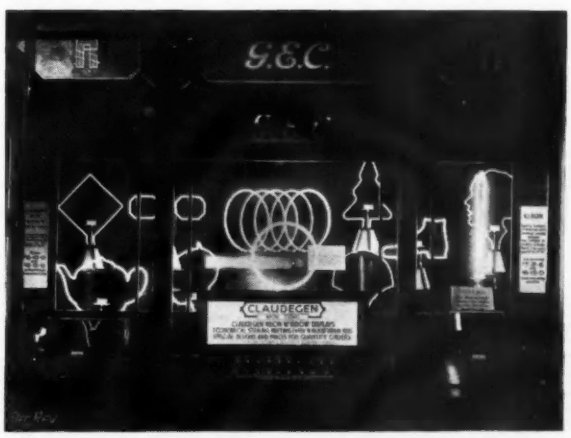
Analysing the above statistics, which are taken from a recent survey published by the Department of Overseas Trade relating to the import trade of India, we find that the total imports of electric fans fell from Rs.15¾ lakhs to Rs.13 lakhs but the United Kingdom's share remained steady at Rs.9½ lakhs. Imports from Italy rose slightly to Rs.2¼ lakhs but arrivals from foreign countries accounted for the principal reduction from Rs.3¾ lakhs to Rs.¾ lakh.

Under the heading of electric wires and cables, the total imports advanced from Rs.43¼ lakhs to Rs.45¾ lakhs, the consignments from the United Kingdom improving from Rs.30¼ lakhs to Rs. 34 lakhs. Imports from Japan fell from Rs.4¾ lakhs to Rs. 4¼ lakhs and those from Germany from Rs.4¼ lakhs to Rs.2¾ lakhs.

The imports of gasfilled lamps remained steady at just under Rs.11 lakhs, the United Kingdom's share being Rs.6 lakhs and that of Holland Rs.2¼ lakhs. Imports of vacuum lamps totalled Rs.11½ lakhs as compared with Rs.12½ lakhs last year. Arrivals from the United Kingdom advanced from Rs.4 lakhs to Rs.4½ lakhs in contrast to imports from Holland which fell from Rs.3½ lakhs to Rs.3 lakhs and those from Japan from Rs.2½ lakhs to Rs.2¾ lakhs. Purchases of torch lamps were reduced from Rs.2½ lakhs to Rs.1½ lakhs in consequence of materially reduced shipments from the U.S.A., Germany and Japan. The United Kingdom's share in this trade is negligible.

The total trade in batteries advanced slightly from Rs.9 lakhs to Rs.9½ lakhs and it is to be noted that the American share rose from Rs.4½ lakhs to Rs.6 lakhs, displacing arrivals from the United Kingdom which fell from Rs.2½ lakhs to Rs.1½ lakhs. Electric carbons (including furnace electrodes) were slightly lower at Rs.2½ lakhs, of which the United Kingdom supplied Rs.1¾ lakhs. The trade in accumulators also remained stationary at Rs.7 lakhs, the United Kingdom's share remaining constant at Rs.5¾ lakhs.

Imports of meters dropped from Rs.7½ lakhs to Rs.5½ lakhs, the United Kingdom's share rising from Rs.4 lakhs to Rs.4¼ lakhs. Electric lighting accessories were also reduced from Rs.6 lakhs to Rs.5 lakhs. United Kingdom suppliers improved their position from Rs.2 lakhs to Rs.2¼ lakhs, but arrivals from Germany fell from Rs.3 lakhs to Rs.1½ lakhs. Imports



A display of "Cleon" signs at present on view in one of the windows of the General Electric Co., Ltd., at Magnet House, Kingsway, W.C.

of unenumerated electrical goods and apparatus fell from Rs.31½ lakhs to Rs.25¼ lakhs. The United Kingdom's share was reduced from Rs.15¼ lakhs to Rs.14¼ lakhs, but that of the U.S.A. fell from Rs.7 lakhs to Rs.3½ lakhs and that of Germany from Rs.6 lakhs to Rs.3¾ lakhs.

Electrical machinery imports declined from Rs.122½ lakhs to Rs.90 lakhs.

Electricity Supply

Lighting, Domestic, Power

Abertillery (Mon).—INQUIRY.—On May 15th Mr. H. Nimmo, chief engineering inspector for the Electricity Commissioners, opened an inquiry concerning an application by the Urban District Council for sanction to borrow £31,645 for the purpose of modernising its electricity undertaking in the Aberbeeg and Llanhilleth district.

Mr. A. H. Dolman represented the council, while the application was opposed by subsidiary companies of the Ebbw Vale Company, the largest ratepayers in the area, the Abertillery Ratepayers' Association and the South Wales & Mon. Public Economy Association. For the council it was stated that the area was divided into two districts as far as electricity supply was concerned. At Abertillery alternating current was supplied *via* three sub-stations (two of these belonging to the Ebbw Vale Company), but at Aberbeeg and Llanhilleth the direct current system was in force. Apart from the current generated at Aberbeeg a supply was received that had to be converted from alternating current to direct current for that particular area. The Aberbeeg plant was installed in 1910, and had served its purpose, the direct current system being in the opinion of the council wasteful and expensive. Evidence in support of the application was given by Mr. T. H. Mytton (chairman of the council), Mr. James Hillier (a former chairman), Mr. Dawson Thomas (electrical engineer to the council), and Mr. John Wayne Morgan, consulting engineer.

At the resumed hearing on the following day, Mr. Coulman presented an alternative scheme, which, he stated, would not cost so much as the original one but yet would be just as efficient. It was described by Mr. H. M. Roberts, electrical engineer to the Ebbw Vale Company, who suggested that the high voltage mains used in connection with the existing electricity scheme at Abertillery should be utilised in the Aberbeeg and Llanhilleth district by the installation of sub-stations. The cost of each sub-station would be about £3,630. The inquiry was then closed.

Alsager (Staffs).—REDUCED CHARGES.—The Electricity Distribution of North Wales & District, Ltd., has intimated to the Urban District Council that it is bringing into force the following reductions in the charges for electricity for domestic use: Flat rate, lighting, 7d. per kWh, subject to a minimum charge of 7s. 6d. for each quarter. Heating only, where no electric cooking is installed, 3d. per kWh for the first 50 kWh per quarter and 1½d. per kWh for all in excess. Cooking only, or cooking and heating, where both are installed, 3d. per kWh for the first 50 kWh per quarter and 1d. per kWh for all in excess.

Ashton-under-Lyne.—REDUCED CHARGES.—The Town Council is to reduce the heating tariff from 1d. to ¾d. per kWh as from the end of the June quarter.

Australia.—GROWTH OF ELECTRICITY SUPPLY.—In a recent speech at Melbourne, Mr. H. R. Harper, chief electrical engineer to the Victoria Electricity Commission, said that 80 per cent. of the power required in Victoria for industrial purposes was now supplied by electricity. The present output amounted to nearly 2,000,000 kWh a day, which was almost equal to the annual output in 1900. In country districts 159 towns were now supplied by the State Electricity Commission, and, of these, 108 had no electricity supply previously. More than 500 farms were using electric power, and two-thirds of these were using milking machines driven by electricity. The average cost of producing a kWh at the north-eastern power station—Rubicon and Eildon—was 0.017d., one of the cheapest production costs of electricity in the world.

Barnard Castle.—SUPPLY TO GAINFORD.—The Rural District Council has passed a plan by the North-Eastern Electric Supply Co., Ltd., for a supply of electricity to Gainford.

Barnsley.—HIRING HOT-WATER APPARATUS.—The Town Council has adopted a scheme of simple hire of electrical hot-water apparatus on similar lines to the existing cooker-hiring scheme.

Barrow.—EXTENSIONS.—The supply is to be extended to Aldingham, Baycliffe, Gleaston, Dendion, and Leece at a cost of £2,500.

Bedford.—MAINS.—The Electricity Committee is to reinforce the general supply mains at a cost of £13,303, and construct an underground main in place of overhead lines at a cost of £1,072. The Committee is also to provide 227 lamps, costing £2,500, for street lighting in the extended area.

Birkenhead.—REDUCED CHARGES.—The borough electrical engineer, Mr. F. E. Spencer, states that reductions in the charges for electricity have been made, the principal among which are as follows: Lighting, from 4d. to 3¾d. per kWh; domestic rate, from 14 per cent. of rateable value, plus ¾d. per kWh, to 12½ per cent. up to £50 rateable value and 10 per cent. in excess, plus ½d. per kWh (0.3d. per kWh for energy in excess of 500 kWh during the summer quarters); power, first 500 kWh per quarter 1.5d. instead of 1.75d., next 1,000 kWh at 1d. instead of 1.25d., all in excess as before; power, l.t., a.c., from £4 16s. per kW plus 0.4d. to £4 10s. plus 0.33d.; h.t., a.c., new rate, £4 plus 0.28d.; commercial cooking and baking, from ⅝d. to ½d. The charges for laying services on private property and rentals for hire of motors have also been reduced. Meter rents have been abolished except in special circumstances.

Bromley (Kent).—EXTENSIONS.—The Town Council is to carry out mains extensions, including one to the Downham Housing estate, at a cost of £1,854. Subject to the London County Council wiring houses (approximately 625) on its estate, the Council will carry out the necessary mains extensions and works at an estimated cost of £8,580.

Buckie.—ELECTRICITY PLANT.—The Electricity Commissioners, replying to an application by the Town Council for permission to install another 350-h.p. Diesel engine for generating current, state that as the Grampian Company anticipates connecting Aberdeen and Inverness by 1935 they have asked it to communicate with Buckie Council regarding a bulk supply.

Burnley.—EXTENSIONS.—The Town Council has agreed to electricity being extended to Cliviger, Habergham Eaves, Ightenhill, and Worsthorne. There will be charges for lighting or power not exceeding 25 per cent. in excess of those in force in Burnley.

Cardiff.—SUB-STATIONS.—The Electricity Committee has obtained sites in Waugron Road and Colum Terrace for the erection of sub-stations.

Coldstream (Berwickshire).—SUPPLY SOON.—A committee has met a representative of the Scottish Southern Electricity Supply Company regarding the laying of cables in the town. Its report was adopted, and a committee was given power to go into the question of street lighting, &c., with the company.

Corby.—ELECTRIC PUMPING.—The Mid-Lincs Electric Supply Co., Ltd., is to supply electricity for pumping plant in connection with a water supply from Blatherwycke Lake for Messrs. Stewarts & Lloyd's steelworks at Corby.

Dartford.—SWITCHGEAR.—The Electricity Committee has obtained sanction to borrow £6,144 for switchgear to replace thirteen e.h.p. panels at the electricity works.

Darton.—SUPPLY EXTENSION.—The Urban District Council has given its consent to the use of overhead lines by the Electrical Distribution of Yorkshire, Ltd., for supplying electricity to the Kexborough Housing Estate.

Droxford.—SUPPLY TO COUNCIL HOUSES.—The Rural District Council has consented to electricity being supplied to Council houses at Wickham by the Portsmouth Electricity Department.

France.—ELECTRICITY PRODUCTION INQUIRY.—The French Ministry of Public Works has appointed a special Commission to inquire into and submit a report to the French Parliament on the practical conditions necessary for a new organisation of the production, transmission, distribution, and consumption of electrical energy for the purpose of the better exploitations of these industries to the general advantage.

POWER STATION DEVELOPMENTS.—In its report for last year the Société des Forces Motrices de la Truyère states that the underground hydro-electric power station at Brommat, although not yet having the advantage of the water storage reservoir, produced about 225 million kWh during 1933. Work on the construction of the hydro-electric power station at Sarrans, where three sets of 33,000-kW turbines and generators are being installed, is well in hand, and it is expected that it will be ready to be put in operation during the next month. A 15,000/200,000-V sub-station has already been completed, and a 200,000-V transmission line has been erected between the power station and a sub-station at Rueyres. A 150,000-V line to connect the Brommat and Sarrans stations with the distributing system of the Société d'Electricité de Marseille is also being erected.

Gainsborough.—RURAL SUPPLY.—Progress is being made with the scheme for electrifying villages on the route between Gainsborough and Market Rasen. It is also intended to carry a second line from Brigg, linking up with Caistor by way of Barnetby, Somerby, Grasby.

Glasgow.—BULK SUPPLY.—The Commissioners decided last year to restrict output at Dalmarnock, and proposed it should be closed for occasional week-ends. This was resisted by the Electricity Committee, which replied that Dalmarnock produced the cheapest electricity in the United Kingdom and was being asked to restrict cheap production to benefit private companies connected with the grid. The Commissioners suggested, as a compromise, that Dalmarnock should be allowed to produce an excess of 7,000,000 kWh a year for grid export in addition to the quantity required by Corporation consumers. The Committee contended that this was inadequate, and has had the export quantity increased to 21,000,000 kWh a year. This will ensure full working time for Dalmarnock and enable the grid to get the benefit of the most efficient and economic production in Scotland. Bailie Munro, convener of the Committee, said they were still hopeful of getting a greater export quota for Dalmarnock, which was undoubtedly the most efficient and cheapest generating plant in Scotland.

Harpole.—SUB-STATION.—The Northampton Electric Light & Power Co., Ltd., is to erect a sub-station.

Hull.—NEW PLANT.—The Electricity Committee has decided to improve the ash-removal plant at the Sculcoates electricity works at a cost of £1,500.

ELECTRIC HEATING OF SCHOOLS.—The Education Committee has decided upon the installation of a system of heating by electricity at the Sutton Ings School.

SUB-STATION.—The Electricity Committee has obtained a site at Loveridge Avenue for the erection of a sub-station.

Hyde.—NEW WIRING.—The Finance Committee has approved a scheme for the renewal of the wiring and fittings at the town hall and municipal buildings.

India.—MADRAS.—Our Bombay correspondent reports that the Madras Electricity Department has now decided to undertake new power extensions, including the transmission of power to Tanjore and Negapatam on the east coast from Pykara, this being one of the longest extensions in South India. In such a long transmission there is likely to be voltage variations, and the Electricity Department is therefore pressing upon the Government the desirability of starting the Mettur hydro-electric scheme as early as possible, with a view to supplementing the power supply from Pykara. The Mettur irrigation project is expected to be completed in June, and will be inaugurated in August. Apart from these new undertakings and extensions, the extension of the Pykara power system from Erode to Trichinopoly, at the cost of nearly Rs. 20 lakhs, is already in progress.

A KOLHAPUR SCHEME.—Schemes of industrialisation involving electricity supplies have been sanctioned by the Maharaja of Kolhapur. Representatives of a British engineering firm are surveying a tract of thirty square miles round Radhanagari, where it is proposed to construct huge reservoirs. The Tata Company, which has electricity works at Lonavla, has been approached to harness the waters for electricity which the State proposes to use for running electric trains and for factories which are to be established.

Isle of Man.—DOUGLAS.—The Electricity Committee has decided to ask its consultants, Messrs. Kennedy & Donkin, to examine the proposals put forward by Mr. B. Kelly, the borough electrical engineer, for a further water-tube boiler and turbo-alternator of 3,000 to 3,750 kW to be installed in an extension of the Pulrose generating station before the autumn of 1935.

Kinmel Bay (Flintshire).—SUPPLY PROPOSED.—A cable is being laid from the power station at Rhuddlan, and it is anticipated that a supply will be available at the end of the month.

Lichfield.—SUPPLY EXTENSION.—The Rural District Council has consented to the provision of overhead lines by the City Council from Elmhurst to King's Bromley to the new Sandhills pumping station, and at Fradley, Alrewas and Shenstone village.

Lincolnshire.—EXTENSIONS.—The Mid-Lincolnshire Electricity Supply Co., Ltd., is shortly to begin work on extensions to Tixover, Bisbrooke, Glaston, Morcott, and Barrowden.

London.—FULHAM.—The Electricity Committee has obtained sanction to borrow £10,000 for rental wiring schemes and £10,000 for mains extensions, and is to improve the lighting in side streets at a cost of £2,338.

A site in Petley Road is to be purchased for the erection of a sub-station.

The foundation stone of the new power station will be laid on June 21st.

HACKNEY.—The Electricity Committee recommends a scheme of e.h.p. feeder mains and controls for the supply of alternating current at an estimated cost of £16,600. It is recommended that the cables be ordered from British Insulated Cables, Ltd. The Finance Committee has approved the recommendations.

ISLINGTON.—The borough electrical engineer reports that owing to the growth of the undertaking it is necessary to make provision for additional transformer plant in certain of the sub-stations and inter-linking mains between certain of the extra h.p. sub-stations, and the Electricity Committee is to seek sanction to borrow £30,000 for this purpose. The Electricity Committee is to replace further rubber-insulated mains at a cost of £920.

STOKE NEWINGTON.—The Electricity Committee has obtained a site in Victoria Road for the erection of a sub-station.

Middlesbrough.—HIRED APPLIANCES.—The Electricity Committee has approved of a scheme whereby an oven, refrigerator, and washing machine can be hired for 10s. per quarter. This applies only to a small area where gas is not available, but other consumers within the borough can take advantage of this offer if they wish to make their homes all-electric.

Nelson.—GAS AND ELECTRICITY COMMITTEES TO COMBINE?—At a Town Council meeting Councillor G. B. Roberts suggested a combination of the electricity and gas committees under the title "The Light and Power Committee."

Oswestry.—STREET LIGHTING.—The Town Council has decided to have the streets lighted by electricity in place of gas.

Oundle.—RURAL SUPPLY.—The Mid-Lincolnshire Electric Supply Co. has received the Rural District Council's consent to the placing of lines, &c., in the parishes of Apethorpe, Fotheringay and Woodnewton.

Oxford.—REDUCED CHARGES.—The Town Council has reduced, as from April 1st, charges as under: Two-part tariff, domestic and colleges, no change in quota or standing charge, but excess "unit" charge reduced from ¾d. to ½d. Business premises, "unit" charge lowered from 1d. to ¾d. Lighting flat rate, first 100 kWh per quarter from 6d. to 5¾d., next 3,650 from 6d. to 5½d., next 2,000 from 5d. to 4¾d., and beyond the present price of 3½d. Prepayment meters from 7d. to 6½d. Shop window lighting from 2½d. to 2d. Small motive power, winter quarters, first 250 kWh per quarter from 2½d. to 2d., next 3,000 from 1¾d. to 1½d., beyond from 1½d. to 1¼d.; summer quarters, first 3,250 kWh per quarter from 1¾d. to 1½d., beyond from 1½d. to 1¼d. Domestic tariff, for prepayment meter consumers, free installation of No. 1 size domestic electric cooker for a minimum of 24 kWh per week at 1d. per kWh., and beyond at ¾d.; free installation of five lights and No. 1 size domestic electric cooker for a minimum of 24 kWh per week at 1¼d., and at ¾d. beyond. Water heating, approximate reduction of 30 per cent. in hire charge, with the present "unit" charge of 0.5d.; where consumer provides his own water heater the "unit" charge is to be 0.45d.

Petersfield.—NEW MAINS.—The Rural District Council has approved plans of underground mains to be laid in the Clanfield district by Portsmouth Electricity Department, and of overhead lines at Liss, submitted by the Mid-Southern Utility Co.

SUPPLY TO HARTING.—The Urban District Council has decided to raise no objection to an overhead line from Buriton to Harting.

Plymouth.—MAINS EXTENSIONS.—The Electricity Committee is to lay cables at an estimated cost of £1,474.

Portland.—NEW PLANT.—The two circulating water-cooling tanks at the air compressor station are leaking badly and beyond repair, and it was suggested to the Gas Committee that an automatic electric compressor, in place of the present gas engine, which would shortly require overhauling, should be installed. The gas engineer stated that if an automatic compressor were installed the present engine could be retained as a standby, and he was instructed to obtain quotations with a view to application being made for a loan.

The floodlighting of St. Augustine's Church, Rugeley, which was carried out by the Trent Valley and High Peak Electricity Distribution Co. during the Lighting Service Bureau's recent demonstration

SUPPLY TO INSTITUTION.—The Electricity Committee is to obtain tenders for cables for the provision of supply to the Borstal Institution, the Prison Commissioners having agreed to make a contribution of £500 towards the cost.

Preston.—SUPPLY EXTENSIONS.—The Mayoress recently inaugurated a supply of electricity provided by the Corporation for Hambleton and Stalmine.

Southampton.—NEW PLANT.—The Town Council has sanctioned a scheme for the installation of a 18,750-kW turbo-alternator, with the necessary plant and buildings, at an estimated cost of £237,000.

Stretford.—LOAN.—The Corporation is to seek sanction to lend a further sum of £200,000 to the Stretford and District Electricity Board, for the purpose of extensions.

Sutton Coldfield.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at Wylde Green, Walmley, and Canwell, and obtain tenders for the supply and erection of switchgear, transformers, and kiosks in connection therewith.

PUBLIC LIGHTING.—The Public Lighting Committee recommends seeking sanction to borrow £2,000 for the continuation of centre street lighting on the main Birmingham-Lichfield Road to Mere Green.

Swinton and Pendlebury.—REDUCED CHARGES.—The Urban District Council has reduced the charges, as follows: Lighting, from 5d. to 4½d. per kWh.; alternate lighting rate, fixed charges as at present, but 25 per cent. addition to the "unit" charge discontinued; domestic power, charge of 1½d. for the first 1,000 kWh per quarter and 1d. per kWh beyond, altered to 1½d. for the first 100 kWh, 1¼d. for the next, and 1d. beyond; all-in domestic rate, fixed charge reduced by 25 per cent., and the "unit" charge of ¾d. for the first 1,000 kWh per quarter and ½d. beyond altered to ¾d. for the first 250 kWh and ½d. beyond; industrial power, ordinary rates reduced

by 5 per cent., and contract rate by 10s. per kW of demand per annum.

Tasmania.—LAUNCESTON.—The report of the electrical engineer, Mr. R. J. Strike, for the year ended June 30th, 1933, shows a net revenue of £75,348 (an increase of £443 over the previous year), working expenses £52,453 (£479 more), and a net profit of £6,745 (£851 more). The total amount of electricity sold amounted to 16,071,112 kWh.

Tynemouth.—LOAN.—The Electricity Committee has obtained sanction to borrow £12,000 for mains and services.

SUB-STATION.—The Electricity Committee has purchased a site at Lovaine Place for the erection of a sub-station.

Uttoxeter.—SUPPLY TO DENSTONE.—The Urban District Council is to give a supply of electricity to Denstone, and the Ministry of Transport has sanctioned the use of overhead lines in the parish of Marchington.

LOAN.—The Urban District Council has applied for sanction to borrow a further £6,850 for electricity purposes.

Walton and Weybridge.—NEW CABLES.—The London and Home Counties Joint Electricity Authority has informed the Urban District Council that, as a result of the increased demand for electricity, it has become necessary to supplement the existing cables between the works at Kingston-on-Thames and the Esher sub-station. The estimated cost of the scheme is £20,200, and the share of the cost to the Council will be £5,040. The Council has approved the extension.

Whitstable.—ACQUISITION OF UNDERTAKING.—The Urban District Council has referred to the Finance Committee for consideration the question of taking steps to acquire the undertaking of the Whitstable Electric Co., Ltd.

Traction

Dover.—TRAMWAY ABANDONMENT DEFERRED.—The Tramways Committee has decided to continue the tramway services until the outstanding loans are repaid, *i.e.*, until March, 1936. Petrol buses will then supersede the trams.

Glasgow.—TRAMWAY EXTENSION.—The Transport Committee proposes to complete the extension of the tramway track from Hillfoot to Milngavie. The rails have been laid for some years, but the overhead electrical equipment has to be installed.

Holland.—NEW DIESEL-ELECTRIC TRAINS.—Forty new Diesel-electric trains are being put into service on the Dutch railways during the next few weeks. Each train has two 410-h.p. Diesel-electric engines. The coaches are 68 ft. long, the entrances being in the centre and the exits at the end. These three-coach trains are claimed to be capable of 90 m.p.h., the weight is 95 tons, and the train will carry 192 passengers.

Hull.—NEW EQUIPMENT.—At a meeting of the Transport Committee the general manager reported that recently there had been offered by transport undertakings traction equipment similar to that purchased by the Committee, and he stated that it would be in the interests of the Committee if he were authorised to tender when any further offers of second-hand equipment were advertised. A sub-committee was empowered to purchase such equipment if deemed advisable.

London.—TRAMWAY ABANDONMENT.—Notice has been given to the Dartford Corporation by the London Passenger Transport Board of its intention to abandon the tramway track in Lowfield Street on July 14th.

South Africa.—NEW CAPE LINE OPENED.—The Cape Flats electrified line, ten miles long, was opened for traffic on April 23rd, construction having taken only thirteen weeks. Except for about four miles of single line from Pinelands to Langa, the entire railway system of the Cape Peninsula and north to Bellville is now electrified. There are 237 electric trains operating daily between Cape Town and Simons Town, Bellville and the Cape Flats.

Sweden.—TRAVELLING CONVERTOR SUB-STATIONS.—The Asea Co., of Vesteras, has recently collaborated with the Swedish State Railways in the design and construction of a travelling convertor sub-station. It consists essentially of a ten-wheel railway truck carrying the motor-generator set, coupled to a four-wheel transformer and switchgear wagon. The motor is a synchronous 6-kV three-phase 50-cycle machine driving a 3-kV single-phase generator developing 2,400 kVA, the speed of the set being 500 r.p.m. Each axle supports a weight of 18 tons. The transformer wagon contains the main step-up transformer, 3-16-kV, which is placed between the three-phase and single-phase switchgear. As a result of the success of the first travelling sub-station the State railway authorities have recently placed an order for a further fifteen outfits.

ELECTRIFICATION OF SWEDISH RAILWAYS.—The Budget Commission of the Riksdag recommends acceptance of the Government programme for new electrification work on the railways with an allowance of Kr. 15,000,000 for the next financial year, learns *Reuter's Trade Service* from Stockholm. The Commission also recommended an allowance of Kr. 13,400,000 for continued electrification work on the Stockholm-Krylbo-Aange and Krylbo-Oerebro lines, and allowances totalling Kr. 15,480,000 for other public works on the State Railways, the telephone and telegraph systems, and the water-power stations.

Switzerland.—RAILWAY ELECTRIFICATION.—The work of electrification of the Biel-Sonceboz and Rorschach-St. Margretten sections of the Swiss Federal Railways has lately been completed, electric trains now being in operation over the two sections. This raises the length of the electrified portion of the Swiss railways to 1,199 miles.

Traffic Signals.—Signals are to be installed in Lea Bridge Road, Leyton (£890). The Lancashire Highways Committee proposes to erect traffic signs at a cost of £1,000, and reports that a scheme for dealing with the 1,147 miles of roads is estimated to cost £18,019.

Communications

China.—TELEPHONE EXTENSIONS.—The *Far Eastern Review* reports that during the past year the Chinese Government has devoted considerable attention to the development of long-distance and city telephone connections. Plans have been carried out for the centralised control over the long-distance system, and measures are being devised for converting city telephone services into a State enterprise. A set of regulations has been promulgated governing the operation of long-distance services by various provincial authorities, which does not, however, conflict with the fundamental plan for unified control over the telephone system by the central authorities.

During the past year plans were completed for the installation of long-distance telephone services connecting Nanking with Hongkong, Tientsin, and Hankow. Construction work on the Nanking-Shanghai line, along the Nanking-Shanghai Highway, is nearing completion, while the Nan-Fu (Nanchang-Fuchow) and the Peiping-Charhar lines are already in operation. Plans have also been devised for the operation of telephone services in the provinces of Kiangsu, Chekiang, Anhwei, Honan, Shantung, and Hopei by utilising the telegraph wires and posts already installed in those provinces. Over 300 districts in the above-mentioned provinces are now connected by telephone. It is also planned to establish a telephone network in the province of Kiangsu, the first stage of the programme being already under way. Measures were also adopted last year to improve the telephone service in a number of cities, including Shanghai, Wuchang, Hankow, Tientsin, Tsingtao, Soochow, Chengchow, and Chinkiang. Radio-telephony will be shortly operating in Nanking, Hankow, and Foochow, while an international radio-telephone service will be inaugurated in the near future.

Great Britain.—RADIO RELAY SERVICES.—Chadderton, Oldham Urban District Council, has granted permission for the operation of a relay service. Mr. R. H. James has received permission to operate a relay service at Bridgend. The advisability of permitting the operation of a relay service in Cleethorpes is under consideration by the Council, and previously unsuccessful applicants are being communicated with. Mr. F. W. Straw is to operate a dual-programme relay service in Colchester; the Council has previously withheld permission.

Hungary.—NEW RADIO STATION.—The new 20-kW station at Csepel will begin tests during the next few weeks.

Portugal.—NEW TRANSMITTER.—As already reported, the new Portuguese broadcasting station will be opened officially on May 28th. The equipment was all manufactured and supplied by Standard Telephones & Cables, Ltd. The new "Emissora Nacional," as it is called, is similar in design to a number of "Standard" transmitters which have already been installed in Sweden, Norway, Czecho-Slovakia, Italy, and Japan, but it incorporates several new features.

The new station is rated to give a power output of 20 kW. in the aerial with 80 per cent. normal modulation, but the depth of modulation can be increased to 100 per cent. without any appreciable distortion. The transmitter has been designed so that at any time the power can be increased to 100 kW.

South Africa.—TELEVISION DEVELOPMENTS.—Experiments in television in South Africa are indicated by the fact that a firm has recently applied in the Union for a large number of patents connected with television, many of them relating to Braun tubes. When the new broadcasting station was opened about two months ago Mr. I. W. Schlesinger, chairman of the African Broadcasting Company, said he intended to introduce television to the Union as early as possible.

TELEPHONE INCREASE.—Since the beginning of the year, when the automatic telephone system was inaugurated in the Cape Peninsula, applications have been received at the rate of sixty a week, and up to about the middle of April the net increase in the number of subscribers was 1,100. At that time there were 19,377 instruments in the Cape Peninsula, compared with 16,055 five years ago.

NEW BROADCASTING STATIONS.—Closely following the successful inauguration of the new broadcasting station at Cape Town, the African Broadcasting Company has decided to install two more high-power Marconi broadcasting stations at Grahamstown and Pietermaritzburg. They will be identical in design with the Cape Town installation.

Sweden.—WIRELESS LICENCES.—An increase in the number of wireless licences of nearly 10 per cent. in 1933 over 1932 is shown by the report of the Swedish Broadcasting Company just published for the year 1933. The number of licences is 666,368 in a population of just over 6,000,000. The direct cost of the programmes for the year was 1,217,000 kronor (£60,000).

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Ashford.—June 4th. Electricity Department. One year's supply of h.p. and l.p. cables. (May 18th.)

Australia.—MELBOURNE.—Posts and Telegraphs Department. June 12th. Telephone switches. (A.Y. 12346.)*
June 19th. Multiple-twin lead-covered telephone cable. (A.Y. 12345.)*
Common battery, floor pattern p.b.x. cord type switchboards. (A.Y. 12378.)*
State Electricity Commission of Victoria. June 4th. Supply for twelve months of v.i.r. cables. (A.Y. 12347.)*

Barking.—May 29th. Electricity Department. 6,600-V switchgear and l.p., a.c. and d.c. switchgear. (May 11th.)
June 12th. Electricity Department. Three 250-kVA and two 400-kVA transformers, one 230-kW glass bulb rectifier, and one 500-kW glass bulb rectifier or steel tank rectifier. (See this issue.)

Barnes.—June 12th. Electricity Department. Glass-bulb mercury vapour rectifier plant. (May 11th.)

Birmingham.—June 4th. Corporation. Installation of three electric lifts at new central fire station. Specification from City Engineer, Council House (deposit £2).

Bristol.—June 30th. Electricity Department. CO_2 fire protective equipment. (See this issue.)

Carlisle.—June 8th. Electricity Department. Transformers. (May 18th.)

Croydon.—June 4th. Corporation. Rubber-insulated cables and meters for period July 1st, 1934, to March 31st, 1935. (May 18th.)

Cupar.—May 28th. Fife District Asylum. Installation of electric lighting and power in dwelling houses and farmstead at Springfield Farm. Specifications, &c., from Resident Clerk of Works; tenders to Medical Superintendent.

Dunfermline.—May 29th. Town Council. Various works, including electric lighting, at twenty-six houses. Schedules from D. H. Shaw, burgh engineer, City Chambers (deposit £1 1s.); tenders to Town Clerk.

Eastbourne.—June 12th. Electricity Department. High-voltage pressure testing equipment. (See this issue.)

Eccles.—May 28th. Corporation. Twelve months' supply of single-phase a.c. house-service integrating watt-hour meters. Specifications from borough electrical engineer, King Street.

Edinburgh.—May 28th. Managers of the Royal Infirmary. Various works, including electrical and heating installation, at new Dermatology and Special Pavilion, &c. Schedules from Works Department Office; tenders to H. Maw, secretary and treasurer.

Egypt.—CAIRO.—July 12th. Ministry of the Interior. Material required for the extension of the electrical network at Mehalla el Kobra. (A.Y. 12361.)*
June 14th. Material required for electric lighting installation for Toukh. (A.Y. 12317.)*
June 11th. Electrically-driven vertical-spindle pump. (G.Y. 13794.)*

Farnworth.—May 31st. Electricity Department. L.p. cables, wiring accessories and a.c. meters. (May 18th.)

Finchley.—May 28th. Electricity Department. Stoneware conduits. (May 18th.)

Gainsborough.—June 8th. Electricity Department. Transformer kiosk, complete with 250-kVA transformer and switchgear. (See this issue.)

India.—CALCUTTA.—June 6th. Electrically driven multiple punching machine for tie-bars and cotters. Particulars from Agent, 105, Clive Street (tender No. S/NS/A2, 189).
SIMLA.—June 11th. Indian Stores Department. Flexible unit type switchgear for M.E.S. Lahore Cantonment. Particulars from Chief Controller of Stores, Engineering Section (tender No. N-2,794).
BANGALORE.—June 5th. Government of Mysore. 2,400 electric house service and power meters. Particulars from Secretary, Stores Purchase Committee.

Inverness.—June 1st. District Asylum Joint Committee. Electrical generating plant at the Asylum. Schedules, &c., from R. Gilbert, clerk, 20, Church Street.

Irish Free State.—DUBLIN.—May 30th. Port and Docks Board. Two four-ton level-luffing electric portal wharf cranes. Specifications from Engineer, East Wall (deposit £1).
June 5th. Joint Committee of Grangegorman Mental Hospital. Overhaul of the electrical installation at Portrane Mental Hospital. Specifications from J. P. Tierney & Co., 44, Kildare Street (deposit £5 5s.); tenders to J. J. Doyle, Grangegorman Mental Hospital.

Keighley.—June 5th. Electricity Department. Metal-clad e.h.p. switchgear. (May 11th.)

London.—BATTERSEA.—June 6th. Borough Council. Four e.h.p. feeder switches. (May 18th.)
ISLINGTON.—June 7th. Borough Council. Electrical installation at City and Queen's Mansions, Holloway. (May 18th.)
H.M. OFFICE OF WORKS.—May 25th. Electric lamps. (May 11th.)
L.C.C.—May 28th. Oil-driven and electrical sewage pumping sets. Particulars from Chief Engineer (A), County Hall, Westminster Bridge (deposit £5).
CENTRAL ELECTRICITY BOARD.—June 28th. 132,000-V transformers and 66,000-V and low-voltage transformers. (See this issue.)
POPLAR.—June 6th. Four 1,000-kW rectifier equipments. (See this issue.)

Morocco.—RABAT.—June 11th. Postal, Telegraph and Telephone Administration. Telephone cable and wire, and instrument cords. (A.Y. 12381.)*

New Zealand.—WELLINGTON.—Public Works Department. Post and Telegraphs Department. July 3rd. Telephone instrument and switchboard cords. (A.Y. 12363.)*
July 24th. 100,000 rubber insulator rings. (F.Y. 2036.)*
July 4th. Telephone keys and key-mountings. (A.Y. 12366.)*
Metal-cased condensers. (A.Y. 12364.)*

Northern Ireland.—BELFAST.—June 7th. Down County Educational Committee. Electric lighting installation for Newtownards Technical School. Particulars from D. C. Quail, director of education, 1, Wellington Place.

Sheffield.—June 4th. Electricity Department. Two 30,000-kW turbo-alternators, complete with condensing plant and auxiliaries, and six 150,000 lb. water-tube boilers with associated equipment. (May 4th.)

Shipley.—June 12th. Electricity Department. E.h.p. and l.p. cables. (May 18th.)

South Africa.—JOHANNESBURG.—June 1st. Government Supplies Board. Telephone cables, loading coil pots and lead jointing sleeves. (A.Y. 12348.)*
Private branch exchange switchboards for automatic telephone exchanges. (A.Y. 12351.)*
Municipality. June 14th. Supply of electric lamps for twelve months commencing September 1st. (A.Y. 12369.)*
Three sets of vehicle-actuated road traffic signals and three sets of fixed time interval signals. (A.Y. 12370).* Six three-phase drop-down type switchboard cubicles. (A.Y. 12375.)* One four-unit and one seven-unit metal-clad l.p. a.c. switchboards. (A.Y. 12374.)*
PRETORIA.—Government Supplies Board. June 15th. One stationary battery. (A.Y. 12373.)*

Southport.—Electricity Department. Transformers, e.h.p. and l.p. switchboards. (May 18th.)

Tain.—June 26th. Town Council. Various works, including electric lighting, at twenty houses. Schedules from J. H. Hinton Gall & Son, architects, 13, Lombard Street, Inverness; tenders to Town Clerk.

Uruguay.—MONTEVIDEO.—June 4th. State Electricity Supply and Telephone Administration. Seventy-eight three-phase oil-cooled transformers for outdoor use. (A.Y. 12354.)*

Wallasey.—May 28th. Corporation. Electrically propelled tower wagon. (May 11th.)

Walton and Weybridge.—May 31st. Electricity Department. 605 yards of 11,000-V and 1,700 yards of 660-V cables. (May 11th.)

Weymouth & Melcombe Regis.—June 15th. Electricity Department. 11,000-V overhead and underground line and l.p. overhead lines. (May 18th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Birkenhead.—Electricity Committee. Accepted. Wiring houses under the assisted scheme. Thirteen (£55).—L. W. Bryan; fifty (£193).—Economic Electric Co.; sixty (£249).—Park Electric Co.; twenty-two (£89).—P. Seymour.

Brentford.—Gas Light & Coke Co. Accepted. One 4-ton electric wharf grabbing crane for works.—Sir Wm. Arrol & Co., Ltd.

Dartford.—Electricity Committee. Recommended. Switchgear at Princes Road sub-station (£151), and at Library substation (£592).—A. Reyrolle & Co., Ltd. Cable (£1,189).—Johnson & Phillips, Ltd.

Government Contracts.—The following contracts were placed by the various Government departments during April:—
ADMIRALTY (CONTRACT AND PURCHASE DEPARTMENT).
W/t motor alternators.—Electric Construction Co.
Amplifiers.—R.I., Ltd.
Dry batteries.—Siemens Bros.
Boards and boxes.—Ferguson, Pailin; W. McGeoch & Co.; Small Electric Motors; Whipp & Bourne.
Electrical boxes, &c.—Basbe, Sadler & Co.; Engg. & Lighting Equipment; W. McGeoch & Co.; Telford, Grier and Mackay; Whipp & Bourne.
Terminal boxes, change-over switches, &c.—W. McGeoch & Co.; Whipp & Bourne.
Electric cable.—Anchor Cable Co.
Electric passenger car.—R. A. Lister & Co.
Condensers.—Walters Electl. Mfg. Co.; Marconi's; H. W. Sullivan; Dubilier Condenser Co.
Voltage control contactors.—Everett, Edgcumbe.
Containers for cells.—I. R. G. P. & Telegraph Works.
Dials, radiogoniometers, &c.—Siemens Bros.
Motor generators.—Mawdsley's, Ltd.
Motor generators for welding.—Met.-Vick. Elecl. Co.
Starters, resistances, &c.—E. L. Bray; Watford Elect. & Mfg. Co.
Supply boards, &c.—Whipp & Bourne.
Main controlling switchboards.—Engg. & Lighting Equipment; G.E.C.
Switches.—G.E.C.; W. McGeoch & Co.; Veritys; L. Weekes; Whipp & Bourne.
Ring main switchgear.—G.E.C.; Bertram Thomas; Whipp & Bourne.
W/t transmitters, &c.—Marconi's; R. I., Ltd.; Siemens Bros.
Tuners, amplifiers, note magnifiers, &c.—R. I., Ltd.; H. W. Sullivan; Siemens Bros.; Marconi's.
Wave-meters and dials.—Marconi's.
WAR OFFICE.
Electric cable.—G.E.C.; Henley's.
Telephone cable.—Siemens Bros.; Standard Telephones; Enfield Cable Works; B. I. Cables; W. T. Glover & Co.

Leclanché cells.—Siemens Bros.
Condenser coils.—J. & E. Hall.
Cold storage plant.—J. & E. Hall. Sub-contractors: W. H. Allen, Sons, & Co.; Ruston & Hornsby.
Electric pumps.—Pulsometer Engg. Co.

AIR MINISTRY.

Accumulators.—Oldham & Son.
Starters for generators.—E. L. Bray.

POST OFFICE.

Telephonic apparatus.—Automatic Electric Co.; Ediswan; Ericsson Telephones; G.E.C.; Phœnix Telephone & Elect. Wks.; Standard Telephones; Telephone Mfg. Co.; F. Willis & Son.
Testing and protective apparatus.—Phœnix Telephone & Elect. Wks.
Cable.—B. I. Cables; Connolly's; G.E.C.; Henley's; London Electric Wire Co. & Smiths; Siemens Bros.; Standard Telephones; United Telephone Cables.
Leclanché cells.—Atlas Carbon & Battery Co.; Ever Ready Co.; Ferguson Battery Co.; Fuller Accumulator Co.; G.E.C.; I. R. G. P. & Telegraph Wks.; Siemens Bros.
Secondary cells.—R. D. Battery Co.; Oldham & Son.
Loading coils.—Standard Telephones.
Telephone cords.—Reliance Electl. Wire Co.
Rectifier elements.—Westinghouse Brake & Saxby Signal Co.
Transformers.—G.E.C.
Bronze wire.—T. Bolton & Sons; B. I. Cables; Johnson & Phillips; F. Smith & Co.
Cadmium copper wire.—T. Bolton & Sons.
Copper wire.—R. H. Symonds; Whitecross Co.; John Wilkes, Sons & Mappleback.
Batteries (replating).—Nottingham telephone exchange.—Britannia Batteries.
Cabling, loading coils and terminations.—Epping: Siemens Bros.
Telephone exchange equipment.—Eltham (London) (new auto exchange); Stoke Bishop (Bristol) (auto exchange); Whitefield (Manchester) (power plant).—Automatic Electric Co. Sub-contractors: Alton Battery Co. for batteries; Electric Construction Co. for generators. Manchester (toll exchange); Prestbury (Cheltenham) (new auto exchange); Brookwood (Woking) (unit auto exchange).—Automatic Electric Co. Ryde (new auto exchange); London (toll and trunk exchanges); Elstree (London) (new auto exchange); Sloan (London) (auto extension); Banbury (power plant).—Standard Telephones. Sub-contractors: Tudor Accumulator for batteries; Electric Construction Co. for generator. Darlington.—Standard Telephones. Penge (London) (new auto exchange).—Siemens Bros. Chelmsford (new auto exchange).—Ericsson Telephones.
Telephonic repeater equipment.—Bristol: G.E.C.

CROWN AGENTS FOR THE COLONIES.

Telephone cable.—Callender's Cable & Construction Co.
Carbon electrodes.—Le Carbone.
Meters.—Ferranti.
Telephone apparatus.—G.E.C.
Copper wire.—Whitecross Co.
X-ray apparatus.—Newton & Wright.

Hull.—Mental Hospital Committee. Accepted. X-ray and electro-therapy equipment for Mental Institution (£1,534).—Victor X-Ray Corporation.
Telephones Committee. Accepted. P.a.b.x. (£395).—Standard Telephones & Cables, Ltd. Switchboards (£176).—Ericsson Telephones, Ltd. Moulded type auto table telephones (£753).—Automatic Electric Co., Ltd.
Electricity Committee. Accepted. Heating and ventilating at Osborne depôt (£1,621).—Bastian & Allen, Ltd.

Hyde.—Health Committee. Accepted. Electrical installation at Mottram Hospital.—C. A. Lamb.

Northern Ireland.—BELFAST.—Education Committee. Recommended. Electric lighting installation at schools: Avoneil P.E.—J. McCaughey. Belmont P.E.—G. McCartney & Co.

South Africa.—CAPE TOWN.—Electricity Committee. Accepted. 4,000 switch and fuse boards (£4,485).—H. Davies & Co., Ltd. 1,000 relays complete with current transformers and contactors for "off-peak" water heating control (£3,125), switchgear (£6,161).—A. Reyrolle & Co., Ltd. Bare copper wire (£4,002), overhead line materials (£1,461).—British Insulated Cables (S.A.), Ltd.
JOHANNESBURG.—New General Post Office. Accepted. Lifts (£15,468).—Waygood-Otis (South Africa), Ltd.

Tynemouth.—Housing Committee. Accepted. Electrical installation at 216 Council houses at Ridges estate (£826).—J. E. Robinson.

Weymouth.—Town Council. Accepted. Synchronising equipment (£131).—English Electric Co., Ltd.

Forthcoming Events

Institution of Electrical Engineers (*Wireless Section*).—Saturday, May 26th. Summer visit to Droitwich. (*London Students' Section*).—Saturday, June 2nd. Summer outing. Tour of the electrification scheme of the Southern Railway. (*South Midland Centre*).—Wednesday, July 4th. Summer meeting. Visit to Messrs. Callender's cable works.

Incorporated Municipal Electrical Association.—May 28th-June 2nd. Liverpool. Annual Convention.

Iron and Steel Institute.—May 31st and June 1st. Institution of Civil Engineers, London. Annual meeting, Thursday, May 31st. Connaught Rooms, London. 7 for 7.30 p.m. Annual dinner.

Physical Society.—Friday, June 1st. Imperial College of Science and Technology, S.W.7. 5 p.m. Short papers will be read.

Overhead Lines Association.—Saturday, June 2nd. Summer meeting. Visit to Stourport power station.

Tramways, Light Railways, and Transport Association.—May 23rd-25th. Annual Congress at Southend-on-Sea.

Institution of Heating and Ventilating Engineers.—June 18th-20th. Summer meeting at Queen's Hotel, Hastings.

Electrical Contractors' Association.—June 27th-29th. Annual conference at Buxton.

Notes

The Overhead Lines Association

At a meeting of the Overhead Lines Association in London on May 16th a discussion on the problems associated with deposits of atmospheric dirt and salts on insulators, conductors, switchgear, &c., was opened by Mr. G. H. Halton, of Steatite and Porcelain Products, Ltd., who said that when dry the effect of deposits was not serious, nor was moisture on a clean insulator serious because normal designs provided an ample factor of safety. But when exposed to a humid atmosphere the dirt absorbed moisture and the soiled parts of the surface became highly conducting and, in addition, the resistance of the clean portion was much reduced. Industrial deposits formed on surfaces to which wind and rain did not have free access; to avoid them properly shaped insulators must be employed.

Sticky, tarry deposits were not easily prevented or removed by wind and rain. The deep rib type of insulator was the most suitable design, but at best it only reduced the frequency of necessary artificial cleaning and increased the difficulty of such work. If insulators when clean could be proved satisfactory by laboratory fog tests they could be relied upon to give satisfactory service in dry, dusty situations. To withstand salt deposit the most satisfactory design must have a long protected creepage surface. Lantern slides of various types of insulators indicated how the ideas Mr. Halton had expressed were being given effect to in practice. He was convinced that reliable results were not to be obtained by laboratory testing alone.

A Radiant Heating System

The "Health-Ray Heat-Wiring" system for warming buildings is the subject of an invention by Mr. Taylor, of Messrs. J. H. Taylor & Co., Macaulay Street, Huddersfield, and is being introduced and marketed by Messrs. Johnson & Phillips, Ltd., Charlton, S.E.7. In principle it appears to be a modification of low-temperature panel heating, large areas of walls and/or ceilings being warmed by suitably placed electrical heating resistors. In construction the scheme amounts to an extended wiring system, except that all the energy carried is dissipated by the wires or conductors themselves. In place of annealed copper conductors of specified current densities, conductors of various specific resistances are employed and operated within the temperatures prescribed in the I.E.E. Regulations. They are arranged in continuous circuits. When installed upon internal surfaces they are usually operated at a loading of one watt per foot run of conductor. Circuits and sub-circuits of any desired loadings can be built up and the warming of buildings can thus be effected by the slight warmth generated in the conductors. The conductors are generally installed in specially designed metal containers, about $\frac{1}{16}$-in. deep, consisting of a base member and cover, which enables considerable lengths of conductors to be quickly and inexpensively installed. The containers are usually applied over the entire area of a ceiling, and the covers of the containers are then papered or otherwise decorated and form the finished surface of the ceiling. The system is thus entirely concealed and the warmth is spread over a large area at low surface temperature.

I.E.E. Midland Students' Outing

The annual summer meeting of the South Midland Students' Section of the Institution of Electrical Engineers will take place on June 2nd. Members will travel by train from Birmingham to London for a visit to the London, Midland and Scottish Railway Co.'s generating station at Stonebridge Park, including an inspection of the electric rolling stock maintenance and car repair shops.

I.E.E. Scottish Centre Meeting

Members of the Scottish Centre of the Institution of Electrical Engineers brought the 1933-34 session to a close with a visit to Dundee on May 11th for the annual meeting with the Dundee Sub-Centre. The party travelled first to Carnoustie where luncheon was served in the Bruce Hotel, and facilities for playing golf were afforded in the course of the afternoon. In the evening the Faraday Lecture, by Mr. Clifford C. Paterson, O.B.E., was delivered, the Earl of Airlie was in the chair and there was a large audience, including many ladies. On May 12th there was an excursion from Dundee to Taymouth Castle Hotel by road, *via* Dunkeld, Birnam, and Aberfeldy.

An Electric Railway Accident

The Ministry of Transport report on the accident at Camden Town on January 1st when a standing L.M.S. electric passenger train from Watford to Euston was run into from the rear by another electric passenger train shows that exceptionally bad fog was the originating cause. The collision came about under very trying conditions as the result of failure of two signalmen who were dealing with the evening rush traffic at the time. Had colour-light signals, repeaters for the use of the fogman, or track circuiting been available the accident might not have occurred.

Makers' Names Wanted

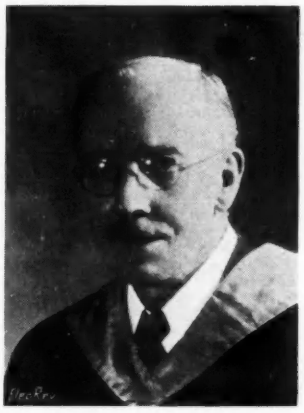
BRITOLUX glassware.
ACE clutch for driving sewing machines.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Ald. G. Billington, chairman of the Light, Heat & Power Committee of the Salford Corporation, was entertained to dinner by his colleagues on the Committee on May 15th to celebrate his completion of twenty-five years' service as chairman of the Committee which controls both the Gas and Electricity Departments. Prior to its formation in 1932, Ald. Billington had been chairman of the Electricity Committee since 1909. Councillor A. Millwood, deputy-chairman of the Committee, referred to Ald. Billington's persistent and successful advocacy of construction of the Agecroft power station, and presented him on behalf of his colleagues with a Stuart period chair, and a pair of old silver candlesticks. In acknowledging the gifts Ald. Billington gave some interesting figures regarding the undertaking's progress from the first year of his chairmanship.

Mr. G. H. Nisbett, managing director of British Insulated Cables, Ltd., was presented with a gold medal on Friday last by senior members of the staff to commemorate his completion of forty years' service with the company. Those present included Messrs. S. P. Doudney, Estimating Department (forty-one years' service), R. P. Nash, resident electrical engineer (forty years' service), A. J. Macphail, publicity manager (thirty-eight years), J. L. Packer, superintendent Cables Department (thirty-eight years), R. Welbourn, chief engineer (thirty-seven years), A. Crook, secretary (thirty-six years), A. Mills, cashier (thirty-six years), S. C. Bullock, superintendent Electrical Fittings Department (thirty-six years), L. J. de Wynter, joint sales manager (thirty-five years), D. Pender, Estimating Department (thirty-five years). Mr. J. Tennant, works manager, Prescot Works, and fifteen other members of the staff with thirty years' service and over were also present.



Mr. G. H. Nisbett

Mr. G. R. Dain, C.I.E., M.C., who has resigned his position as agent of the Calcutta Tramways Co., Ltd., has arrived in England. He has had thirty years' service in India, most of it with the East India Railway, which he joined in 1904, interrupted only by service in the war. For a time he was superintendent of the Railway School of Transportation at Chandausi, in the United Provinces, and was appointed agent of the Calcutta Tramways Co. in 1926. At Calcutta he introduced many improvements to overcome the intense omnibus competition, such as greater speed, cheap mid-day fares, and better equipped vehicles. He is succeeded by **Mr. W. R. Pepper,** the chief engineer, who has been with the company since 1907.

Mr. J. Gartshore, mains assistant with the Wolverhampton Corporation Electricity Department, is retiring after thirty-eight years' service, and he is being presented by the chief engineer and the staff with an appropriate gift in appreciation of his long service. Before going to Wolverhampton Mr. Gartshore served with the Bournemouth and District Electric Light Co., following which he was employed by the Electric Construction Co.

Mr. G. Raw, of Messrs. Forster, Raw & Partners, has been elected president of the North of England Branch of the Association of Mining Electrical Engineers for the ensuing year. This is the second time he has held this office.

Mr. R. A. Bruce has resigned from the board of Messrs. Petters, Ltd., and also from the position of managing director of the Westland Aircraft Works, a branch of Petters, to take effect as from June 30th next. He has offered his services to the company in a consultative and advisory capacity, and his offer has been accepted. **Mr. W. E. W. Petter** has been co-opted by the board.

Prof. J. T. MacGregor-Morris has been nominated as chairman of the Meter and Instrument Section of the Institution of Electrical Engineers for the 1934-35 session.

Mr. S. E. Garcke, chairman of Tillings & British Automobile Traction, Ltd., has been elected president of the Institute of Transport. He will take office on October 1st.

Mr. J. P. Plant has been elected chairman of the board of management of the Birmingham Section of the British Industries Fair, to be held next year, in succession to Mr. C. E. Greener.

Mr. W. A. Tookey, consulting engineer, has removed to 36, Victoria Street, S.W.

Lord Ashfield, who recently underwent an operation for a break in the retina of one eye, has returned to his London home. It is reported that the operation has proved successful and the sight of the affected eye is expected to be completely restored.

Mr. A. G. Roper has been appointed assistant sales and service manager at the head office of B.E.N. Patents, Ltd. Mr. Roper was previously in charge of the company's showrooms in Tottenham Court Road, and his place there has been filled by **Mr. A. Keall.**

Mr. G. McLean, maintenance engineer with the Hull Corporation Electricity Department has been appointed personal engineering assistant to the city electrical engineer at a salary of £586, rising to £750. Mr. McLean had experience in electricity undertakings at Liverpool and Calcutta before going to Hull. The vacancy was caused by the appointment of Mr. G. A. Vowles as electrical engineer to the Halifax Corporation.

Mr. E. C. Linay, A.M.I.E.E., deputy electrical engineer with the Worksop electricity undertaking, has been appointed manager of the electricity works of the Sleaford Urban District Council.

Mr. W. B. Ewart has resigned his position on the sales staff of the Southend-on-Sea Corporation Electricity Department to take up an appointment as technical representative with the Electric Tubular Heating Co., Ltd., a newly formed company. Prior to joining the Southend Corporation Mr. Ewart was for several years with Messrs. Young, Osmond and Young, Ltd., as estimator and sales representative.

Mr. G. H. Bucher has been elected president of the Westinghouse Electric International Co. He joined the company in 1909, and for the past two years he has been vice-president and general manager.

Obituary

Mr. H. Green.—The sudden death is announced, at the age of fifty years, of Mr. Harold Green, A.M.I.E.E., of Shoreham-by-Sea, Sussex. At the age of twenty he took charge of the electrical plant at the Brackley Coke Works, and he was subsequently for many years chief electrical engineer to the Bridgewater Collieries, Lancashire. He carried out schemes of linking up and electrifying all the individual collieries in the Bridgewater group, and he also carried out a similar scheme in Yorkshire. In the early days of wireless he fitted out a broadcasting station at his home at Swinton.

Mr. E. Coates.—The death took place on May 14th, at the age of fifty-two years, of Mr. Ernest Coates, electrical engineer, of Merrydale Avenue, Stockton-on-Tees, who had been in control of the electrical department of the Reay Brass Foundry Co., Ltd., Eagle Works, Stockton. He was formerly with the South Durham Steel and Iron Co., Ltd., of Middlesbrough.

Mr. T. S. Bell.—The death occurred suddenly on May 16th of Mr. Thomas Swainson Bell, head of the firm of T. S. Bell & Co., electrical engineers, of Whitehaven. He was sixty-nine years of age, and was one of the pioneers of electricity at Whitehaven. He was for many years second in command to Mr. Watts, a former borough electrical engineer, and he afterwards joined the late Mr. Jacques in his electrical engineering business in Tangier Street.

Mr. G. Ross, acting works superintendent of the Johannesburg municipal tramways, has died at the age of sixty. He was a native of Aberdeen, and had been employed by the Johannesburg municipality for twenty years. He was due to retire in July on reaching the age limit.

Mr. A. Hughes.—The death is announced at the age of fifty-four years of Mr. Amos Hughes, of the staff of the Research Department of Marconi's Wireless Telegraph Co., Ltd., Chelmsford. He was previously with Crompton, Parkinson, Ltd.

Col. J. W. F. Thelwall.—The death occurred recently in Berlin of Lt.-Col. John Walter Francis Thelwall, C.M.G., M.C., Commercial Counsellor at the British Embassy in Berlin.

Mr. J. B. Kee, of Ramsey, a member of the Isle of Man Electricity Board, died recently.

Dr. Ing. R. Boveri.—The death recently occurred at the age of sixty-one years of Dr. Ing. Robert Boveri, the technical director of Messrs. Brown, Boveri & Co., of Mannheim. The deceased had been associated with the business for the past thirty-four years.

Wills.—Sir Thomas Ryan, of New Delhi, Director-General of Posts and Telegraphs in India, left £15,412 (net personalty £15,404).

Mr. A. W. Bridges, electrical engineer, of Newcastle-on-Tyne, left £8,288 (net personalty £8,052).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Electrical Inspection & Service Co., Ltd.—Private company. Registered May 14th. Capital, £250 in £1 shares. Objects: To acquire the business of an electrical engineer and contractor carried on by G. C. Smith as the Power Plant Inspection and Service Co., at 60, Wood Street, Manchester. The first directors are: G. C. Smith, 7, Granville Road, Timperley, Ches.; and A. J. Faragher, 7, Stratton Road, Whalley Range, Manchester, 16. Registered office: 1, Brazenose Street, Manchester, 2.

Bridges' Auto-electric Works, Ltd.—Private company. Registered May 14th. Capital, £3,000 in £1 shares. Objects: To acquire the business of battery and magneto engineers and agents now carried on by the executors of Arthur W. Bridges, at 10, Carliol Place, Newcastle-on-Tyne, as "Bridges' Auto-electric Works." The provisional directors are: A. Urwin, "Fairfield," Wardworth, Northumberland; and W. P. Dickinson, 28, Roker Avenue, Whitley Bay. Secretary: W. P. Dickinson. Solicitors: Lundi, Shortt and Fenwicke, 15, Grey St., Newcastle-on-Tyne.

Burchnell's Battery Service, Ltd.—Private company. Registered May 16. Capital, £3,000 in £1 shares. Objects: To acquire the business of an automobile electrical engineer carried on by F. Burchnell, at 102, High St., Fletton, Hunts. The first directors are: F. Burchnell and L. A. Burchnell, both of 102, High St., Old Fletton. Secretary: Laura A. Burchnell. Solicitors: Mellows and Sons, 45, Priestgate, Peterborough.

Johnson & Dare, Ltd.—Private company. Registered May 14th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of, agents for and dealers in electric lighting fittings and accessories and general electrical goods of all kinds, and in instruments and apparatus connected with radio-telegraphy and telephony, etc. The directors are: J. B. Johnson (permanent), 36, Tower Hill, Hampstead, Birmingham; and A. E. Dare, 40, Robert Road, Handsworth. Registered office: 115, Villa Road, Handsworth, Birmingham.

Cawley's Wireless Service, Ltd.—Private company. Registered May 16th. Capital, £1,000 in £1 shares. Objects: To carry on the business of wholesale or retail wireless distributors, manufacturers of all types of wireless and electrical equipment, including talking picture and television equipment, &c. The directors are: W. Cawley and Annie E. Cawley, both of 441, Prescot Road, St. Helens. Secretary: W. Cawley. Registered office: 4, Church Street, St. Helens.

W. & H. Nelson, Ltd.—Private company. Registered in Edinburgh May 17th. Capital, £1,000 in £1 shares. Objects: To acquire the business of an engineer, factor and agent now carried on by W. A. Nelson at 245, Main Street, Bellshill, Lanark, under the style of "William Nelson," and to carry on the business of electrical, mechanical, wireless, telephone, lighting, heating, motor and general engineers, &c. The first directors are: W. A. Nelson, Bledworth, Elvan Street, Motherwell; and D. H. Nelson, 19, Beechwood Gardens, Mossend.

Returns of Electrical Companies

Edison Bell, Ltd. (old company).—F. S. S. Tull, 3, Fredericks Place, Old Jewry, E.C.2, ceased to act as receiver and manager on May 8th, 1934.

Truphonic Radio, Ltd. (old company).—E. D. Basden, 73, Basinghall St., E.C.2, ceased to act as receiver on May 7th, 1934.

Dicks Wireless & Electrical Factors, Ltd.—Two debentures dated April 17th and 26th, 1934, to secure £100 and £150, respectively, charged on the company's undertaking and property, present and future, including uncalled capital. Holders: Mrs. M. Green, 10, Sidmouth Road, Brondesbury; and Mrs. A. Allen, 4, Rutland Park Gardens, Willesden Green, N.W.

Nuvolion Electrics, Ltd.—Capital, £2,000 in 1,000 "A" ordinary and 1,000 "B" ordinary shares of £1. Return dated November 8th, 1933 (filed March 23rd, 1934.) All shares taken up. £1,250 paid on 1,000 "A" ordinary and 250 "B" ordinary shares. £750 considered as paid on 750 "B" ordinary shares. Mortgages and charges, £2,000.

Star Radio Products, Ltd.—Capital, £100 in £1 shares. Return dated October 27th, 1933 (filed January 13th, 1934). All shares taken up. £100 paid. Mortgages and charges, nil.

Folkestone Radio Relays, Ltd.—Capital, £3.000 in £1 shares. Return dated November 14th, 1933 (filed March 28th, 1934). 1,250 shares taken up. £1,250 paid. Mortgages and charges, £243 8s. A further 100 shares were allotted for cash on March 19th, 1934.

St. James's Electrical Co., Ltd.—Capital, £100 in 1s. shares. Return dated October 20th, 1933 (filed March 23rd, 1934). All shares taken up. £100 paid. Mortgages and charges, nil.

Neon Art Products, Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1933 (filed March 17th, 1934). All shares taken up. £100 paid. Mortgages and charges, nil.

Sunbeam Electric, Ltd.—Capital, £10,000 in £1 shares. Return dated December 7th, 1933 (filed April 9th, 1934). 4,000 shares taken up. £4,000 paid. Mortgages and charges, £2,200.

Lamplugh Radio, Ltd.—The nominal capital has been increased by the addition of £11,600 beyond the registered capital of £400. The additional capital is divided into 695 6 per cent. cumulative participating preference shares of £10 and 18,600 ordinary shares of 5s.

D. Lloyd Lewis, Ltd.—Particulars filed of debentures not exceeding £2,500 authorised May 8th, 1934, charged on the company's undertaking and property, present and future, including uncalled capital (if any), the amount of the present issue being £1,150.

Rawswood Radio Corporation, Ltd.—Debenture dated April 24th, 1934, to secure £500, charged on the company's property, including uncalled capital. Holder: Mrs. G. M. M. Wood, 28, South Park Drive, Blackpool.

City Notes

The Brush Electrical Engineering Co., Ltd., held its annual meeting on May 17th, Mr. F. R. Davenport (chairman) presiding. In presenting the report and accounts (ELEC. REV., May 11th, p. 687), the chairman said that the heavy loss on trading was due to a serious shortage of work and to the very low prices ruling for the orders obtained, both home and overseas. This was true in all departments. In the Rolling Stock Department both these conditions existed, the one from a very severe contraction of the orders placed by transport concerns, due partly to the restrictions of the Road Transport Commissioners, and the other due to the absurd lengths to which competition between manufacturers was carried in the endeavour to secure a share of the business offering. During the year, however, they had made and supplied both composite and all-metal bodies, single-deck and double-deck, for various petrol buses, and had made the necessary arrangements for quantity manufacture of all-metal bodies, although they believed that the composite body had many advantages which would ensure that for years to come a large proportion of the motor bus bodies in Great Britain would be of this type. The engineering side of their business suffered equally with the rolling stock side from a reduced demand and appallingly low prices. There were very few orders placed for which the Brush-Ljungstrom turbine could be offered, but among those obtained was an order for the 10,000-kW house set for the new Fulham power station. Among auxiliary lines were orders for two 2,500-kW motor convertors for Luton, and one 2,000-kW set for the Birmingham Corporation. The Motor Department had been more busy; they obtained important frequency-change contracts for the Cornwall area, as well as similar orders elsewhere. Among the work carried out by the Transformer Department were the 11,000-kVA units with on-load tap-changing gear for the supply to Stewarts & Lloyds' new works at Corby. During the past year they commenced, as new features, the manufacture of oil engines and of homogenisers. The latter had been supplied to a number of customers in the dairy and chemical industries. The Brush oil engine combined for the first time in the horizontal engine total enclosure and complete automatic lubrication. Little more than preliminary work was possible in 1933, but they had a promising order book, and the Blue Star Line had recently ordered six 250-b.h.p. engines for driving refrigerating machinery on three liners which were under construction. They had undertaken orders for parts of machinery required by other manufacturers, and sometimes for complete machines, as, for example, two large balancing machines for the Admiralty. Toward the end of the year they entered into an arrangement with prominent Continental manufacturers of steelworks machinery to make to their designs plant for British steelworks; their first orders were, however, not undertaken until the current year. Reference had been made recently by the chairmen of companies engaged in similar work to themselves, to the excess of productive capacity from which they now all suffered. This had led in some quarters to price-cutting that could only be termed insane and did no one any good. The grid system seriously reduced the quantity of power plant required and this coinciding largely with the world depression of the last few years had hit certain companies very severely. Consideration should be given to this condition of excessive capacity with a view to stabilising this branch of the industry; it should be organised to yield fair prices and a reasonable return on capital. If the industry was too large for the present demand it should consider closer co-operation and merging its interests for the common good. They would gladly confer in that direction. The leading customers of the industry, say, purveyors of electrical power and owners of road transport concerns, secured a good living and a good return on their capital, and it was only fair, therefore, that those manufacturers who were the complement of those industries and had assisted them to attain their position should also receive a fair return on their labour and be able to earn a fair yield on the capital entrusted to them. The current year was showing rather better prospects, their orders having increased and in some directions prices had also risen.

The British Power & Light Corporation (1929), Ltd., held its annual meeting on May 17th, when Mr. C. E. Benson, who presided, said that the net decrease in earnings available was due to two factors—first, and to a minor degree, by the preference dividend which had been paid this year for a full year as against a broken period last year, and secondly, to the largely decreased dividend which they had received from the North Wales Power Co. The sales of the North Wales Power Co. continued to make progress, but, despite the increases from all sources, it had been found necessary to reduce the North Wales Power dividend from 3½ per cent. to 2 per cent. Two causes were responsible for that, viz., rates and the drought. Electrical undertakings were assessed for rates on their net profit-earning capacity. But the capital cost of a hydro-electric station per kW of capacity was much higher than the cost of a coal station, due to the substantial capital expended in connection with the storage of water. In determining the rateable value of the undertaking, this difference in the capital cost was not taken into account. In order to obtain some fair measure of relief, a Parliamentary Bill was promoted by the company, which included a clause dealing

with the rating question. The Committee of the House of Lords had accepted in principle all the clauses of the Bill with the exception of the rating clause, which was rejected. Owing to the unprecedented drought which prevailed throughout last year, it had been necessary for the North Wales Power Co. to purchase from outside sources a large quantity of energy to meet the demands of its consumers. In 1932 the cost of energy purchased from outside sources had been £10,285. In 1933 that figure had risen to £35,973. The Electricity Distribution of North Wales and District continued to make good progress, and the English distribution companies were expanding in a satisfactory manner. This group of smaller companies had been steadily developing each year and had now reached a point where, as a whole, they were on a profit-earning basis, after meeting interest on the company's advances to them and after charging full depreciation from the inception of each company. During the first three months of 1934 the subsidiary companies continued to make progress, despite the shortage of water which still continued in North Wales. During the year Mr. R. S. Hilton and Brig.-Gen. R. F. Legge had been elected to the board of the Corporation.

The Urban Electric Supply Co., Ltd.—Presiding at the annual meeting held on May 17th, Sir Holberry Mensforth (chairman) said that the number of consumers taking a supply from their mains and from the mains of the subsidiary companies at the end of the year under review was 26,837, of whom 3,279 were added during the year. The new load connected was 5,111 kW, making the total 55,331 kW. The sales of electricity totalled 25,206,200 kWh, as compared with 20,010,700 kWh in 1932. Their Cornish undertakings had made steady progress, which had been helped by the better working of the tin mines and industry generally. The staff in Cornwall was engaged on the change-over of the system of supply from 25 to 50 cycles, which was necessitated by the generating station at Hoyle being classified as a selected station. They had made substantial additions to the h.p. transmission lines, and this had enabled them to shut down the generating plant at Newquay and provide an a.c. bulk supply from Hoyle. They also took over the district served by Fringe Orders from Falmouth, and changed over the old d.c. system to a.c. They had in hand a programme for the current year of further development for the Cornwall area, and it was their intention to shut down a number of smaller generating stations and change over the systems from d.c. to a.c. Their Caterham and Woldingham undertakings were sold as from January 1st last to the County of London Electric Supply Co. In February last they acquired a controlling interest in the East Anglian Electricity Supply Co., Ltd., the purchase money being found by the sale of certain investments which were yielding a very low rate of interest.

S. Smith & Sons (Motor Accessories), Ltd., propose to make a further issue of capital on bonus terms, and an extraordinary meeting is to be held on June 14th for the purpose of authorising the sub-division and conversion of 128,000 unissued £1 ordinary shares into 100,000 £1 preferred ordinary shares and 560,000 1s. deferred ordinary shares. It is proposed to offer 50,000 of the preferred ordinary and 280,000 of the deferred ordinary shares to existing shareholders in the proportion of one in four at 30s. and 3s. per share respectively. The remainder of the converted shares will be retained in order that they may be issued by the directors when opportunities present themselves for expanding the company's business. The directors state that the company's turnover and profits for the current year are greater than for the corresponding period of last year, all branches of the business having increased to an extent which has rendered important additions to the manufacturing facilities essential. Several of these additions have already been made and others are in process of construction.

The Chloride Electrical Storage Co., Ltd., reports a profit for the year ended March 31st last of £244,910, as compared with £172,958 in the preceding year, to which is added £104,129 brought in making £349,039. After providing for depreciation, directors' fees, &c., it is proposed to pay a final dividend of 5 per cent., less tax, on the "A" and "B" ordinary shares, making 10 per cent. for the year (against 12 per cent.). The report states that in view of the facts that in the last two years additions have not been made to general reserve, and that the company's business is constantly expanding, the directors deem it advisable to conserve a substantial portion of the profits available. They therefore propose to place £125,000 to the reserve fund, making this fund £425,000. The balance carried forward is £72,191. Meeting: June 1st.

Siemens Bros. & Co., Ltd., report a profit for 1933, after providing for depreciation, of £30,909, as compared with £291,450 in the preceding year. A sum of £165,000 is credited in respect of past profit on the sale of investment in a subsidiary and unrequired reserves for contingencies in the same company which now become free, increasing the profit balance to £195,909. The report states that the fall in the company's business in 1932 continued during 1933, the turnover for that year being 55 per cent. of that of 1931. Price levels were also lower, and notwithstanding economies in overhead charges net profits dwindled severely. The ordinary dividend for the year is 4 per cent. (6½ per cent. for 1932), and £379,436 is carried forward, against £381,916 brought in. Meeting, May 25th.

Haslam & Newton, Ltd., report a trading loss for the year ended March 31st last of £1,691, as against a loss of £14,647 in the preceding year. After charging £7,908 for losses on non-current stocks, and crediting £3,500 from tax reserve, the net loss is reduced from £25,289 to £17,561. The total debit is now £66,827. The preference dividend is paid to September, 1929. The directors are of opinion that the book values of land and buildings are in excess of present-day values, and so soon as the company is on a sound trading basis a scheme will be submitted to deal with such excesses and also to write off old debts and debit balances, investments, underwriting and preliminary expenses and the adverse balance on profit and loss account.

Imperial & International Communications, Ltd., reports a gross revenue of £4,576,532 for 1933, as compared with £4,946,804 in the preceding year. In addition to the ordinary expenses there has been provided £137,097 for cable renewals and the sum of £88,500 has been written off in respect of losses of subsidiary companies and the cost of terminating a joint purse agreement and other expenditures, leaving a profit of £209,552. To this is added £26,024 brought in, making £235,576. The dividend is 11s. 8d. per cent., leaving £60,576 to be carried forward.

Cables & Wireless, Ltd., reports a gross revenue for 1933 of £720,064, as compared with £705,474 in 1932, and a profit of £662,295 (against £649,220), to which is added £75,450 brought in, making £737,745. The preference dividend (2¾ per cent., less tax), being one-half of the dividend in respect of 1932, absorbs £638,469, leaving a balance of £99,276, which is carried forward. The consolidated balance sheet shows that the Government and other securities held within the group amounted to £15,925,080, representing a depreciation of £609,635, which, however, was more than offset by the profit of £1,379,003 on the sale of securities.

The Delhi Electric Supply & Traction Co., Ltd., reports a profit for 1933 of £53,143, as compared with £44,944 in the preceding year, to which is added £20,633 brought in, making £73,776. Depreciation and renewals reserve receives £9,000, British and Indian taxation £9,245, and general reserve £7,966. It is proposed to pay a final dividend of 8 per cent., making 12 per cent. for the year, and to carry forward £23,565. The sales of electricity totalled 6,897,265 kWh, as against 6,417,659 kWh in 1932, and the number of passengers carried by the traction undertaking rose from 5,912,802 to 7,250,908.

J. Stone & Co., Ltd., report a trading profit for 1933 of £19,279, plus £45,000 from contingency and tax reserve, and after deducting directors' fees, depreciation, &c., there is a balance of £11,365, which with £121,490 brought in makes £132,854 available. The preference dividend is paid and £93,854 is carried forward.

Meters, Ltd., reports a net profit for the year ended March 31st last of £21,333, as compared with £21,955 for 1932-33. The final ordinary dividend is 6½ per cent., maintaining the distribution for the year at 9 per cent., and £5,894 is carried forward.

The Electric Supply Corporation, Ltd.—At an extraordinary meeting held on May 22nd a resolution was passed adding a new article and capitalising £99,522, part of the capital reserve. Ordinary shareholders will receive three fully paid £1 ordinary shares for every ten held.

Telephone Rentals, Ltd., will hold an extraordinary meeting on June 11th at which proposals will be submitted for increasing the capital from £600,000 to £800,000 by the creation of 800,000 shares of 5s. each.

Richard Johnson & Nephew, Ltd., report a net profit for the year ended March 31st last of £29,292, as compared with £38,149 for 1932-33, to which are added reserves no longer required (£5,000) and £30,786 brought in. The ordinary dividend is maintained at 7 per cent. and £32,791 is carried forward.

The Dubilier Condenser Co. (1925), Ltd., reports a profit for the year ended March 31st last of £17,195, as compared with £7,075 in the preceding year. It is proposed to pay an ordinary dividend of 10 per cent. and to carry forward £5,468. The report states that the business has been substantially the same, but the profits available show a considerable increase and the indications for the current year are favourable.

The Sphere Investment Trust, Ltd., reports that after providing for debenture interest, &c., the revenue account for the year ended March 31st last shows a credit balance of £32,838, making with £9,895 brought in £42,733. It is proposed to pay an ordinary dividend for the year of 2 per cent., and to carry forward £12,108.

The Mid-Southern Utility Co. is making an issue of £125,000 of 3½ per cent. redeemable registered bonds. This is part of £250,000 authorised and is redeemable at par on May 31st, 1944. The capital now required is for the purpose of further expansion and development and will be immediately revenue-producing.

The Consolidated Gas, Electric Light and Power of Baltimore has declared a dividend of 90 cents (same) on the common shares for the quarter ending June 30th.

Stocks and Shares

TUESDAY EVENING.

STOCK Exchange tradition, half a century old, says that markets are generally active between the beginning of October and the following Derby Day. If the superstition is to hold good this year, the Stock Exchange has only about a fortnight more in which to expect its markets to continue animated. Members of the House, and that very large body of the public which to-day takes interest in market matters, need entertain no fear of an immediate falling-away in business, with the inevitable sagging process that this enforces upon quotations. There is too much money still awaiting investment for reaction to make headway. While the net result of recent by-elections is regarded with a little uneasiness, the political forces that might make for depreciation of capital are not sufficiently near at hand for them to exercise any practical effect.

New Issues

The County of London Electric Supply new 4 per cent. preference shares, offered at what looked to be the high price of a guinea each, were started in the market at 3d. premium. Shareholders in the company received preferential treatment and obtained 40 per cent. of their subscriptions. Outsiders were allotted about 20 per cent. One bold stag applied for 100,000 shares. He got 18,000. A premium of threepence per share would have enabled him to clear £225 profit.

With evidence so striking in front of them in regard to public appetite for first-class stock, other electricity supply companies are hardly likely to allow such opportunity to pass for making new issues. The London companies, or at least the majority of them, are probably in no need of capital, but

the provincial undertakings have ambitious programmes, and are seldom backward in coming forward when supplies of investment money are available upon easy terms.

Public Boards and Authorities

Until the Central Electricity Board makes another new issue of stock, it is safe to assume that rumour will industriously canvass the likelihood of its appearance at some early date. Prices in this section remain very hard. London Passenger Transport 4½ per cent. "A" and the 5 per cent. "B" stocks are 1 higher at 119¼ and 123½ respectively. The promise of a dividend on the "C" stock, to be made in July, has not encouraged buyers, and the price is down 1 at 78½. Market anticipations made in advance of Whitsun were looking for bumper holiday receipts, but the somewhat cheerless weather over the week-end did not favour record-breaking in the way of traffics.

Cables and Wireless

The annual accounts of Cables & Wireless, accompanied by those of Imperial & International Communications, have now been published. They make a moderately satisfactory showing. The net profit for the year of £662,300 is £13,075 up. Payment of one-half of the dividend on the 5½ per cent. preference stock for the year 1932 enables £99,276 to be carried forward, this being an increase of £23,800. Full details appear under "City Notes." The dividend decision had been announced previously, occasioning disappointment, from the effect of which the market has not recovered. The ordinary stocks are both lower again. Globe Telegraph & Trust preference hardened to 13. The Cables & Wireless meeting is to be held on Thursday in the present week, when references will doubtless be made to the benefit expected to be drawn from the extensive campaign of advertising upon which Cables & Wireless has embarked.

Siemens's Results

While the Siemens accounts show a loss on trading for the year 1933, there are various credits which permit the payment of 4 per cent. dividend for the year on the ordinary shares, and a carry forward of £379,436 to next account. The latter amount is £2,500 less than was brought into the current year's accounts. What saved the situation was a special dividend from Siemens's subsidiary, Caxton Electric Developments. The meeting will take place on the Friday in this week. Siemens ordinary are dull, though nominally unchanged at 18s. 9d. Other shares in this group present no striking alterations. Associated Electrical Industries ordinary are 6d. better at 18s. 3d. British Aluminium at 30s. have also improved by a few pence. Chloride Electrical Storage A and B shares are steady at 2¾. Both classes are to receive 10 per cent. dividends for the year, comparing with 12 per cent. on a smaller capital in the preceding twelvemonth. The profit of £244,910 is £66,000 up on the year.

Manufacturing Companies

Aron Meters have resumed their interrupted rise, rallying to 53s. 6d. Dubilier Condenser Company ordinary shares of a shilling each are a shade better at 1s. 3d. upon the issue of a report showing substantial increase in earnings. Dividends of 10 per cent. are declared on the ordinary and the preference shares, against nil last year in each case. The preference are 10s. shares, and are quoted at that par price. Telephone Rentals will hold a meeting on June 11th for the purpose of increasing the capital from £600,000 to £800,000 by creating 800,000 new shares of 5s. The present shares stand at 8s. 1½d. Ericsson Telephone ordinary strengthened to 70s. Telephone & General Trust 7 per cent. preference are up to 30s., and Telephone Properties 8 per cent. preference to 26s., both being harder on the week.

Electricity Supply Shares

What few price movements have to be noted in our lists are, in financial journalese jargon, adverse to holders. Metropolitans have eased off to 52s. 6d. and County of London to 57s. 6d. Edmundson's ordinary are a trifle lower at 41s. 6d. North Metropolitans can be bought at the middle price of 63s. 9d. Southern Areas keep good at 23s. 3d., West Gloucester ordinary is steady at 87½. Hendons have gone back to 56s. 3d. An easier tendency is observable in Bournemouths, Clyde Valley, North Easterns and Yorkshires. Electric Supply Corporation shares, already quoted ex dividend, will be ex bonus in the course of the next few days. Victoria Falls ordinary refuse to be kept down; the price at 6⅜ is 3s. 9d. up, and the return on the money, on the basis of the last paid dividend of 20 per cent., is less than War Loan affords. For all that, the price is talked higher, in the hope of increased dividends.

Miscellaneous Matters

American Telephone & Telegraphs are up 3 points. Internationals recovered to 13. But matters in America are far from happy, and speculation, as well as investment, adopts a very cautious attitude. Brazilian Tractions fell into single figures, touching 9⅝ on Dutch sales. Shares in the Canadian hydro-electric concerns are mostly easier, though not materially. The markets in raw rubber and in rubber shares have been reactionary. The recent resiliency has given place to a deflationary disposition. Iron and steel shares are attracting increased interest, as a result of which the prices in this section are quietly improving.

Share List of Electrical Companies

Home Electricity Companies

	Nom.	Dividend. 1932.	Dividend. 1933.	Price. May 22.	Rise or Fall.	Yield. p.c. £ s. d.
Bournemouth and Poole	1	15	15	76/3	—¼	3 18 9
Brompton Ordinary	1	7	7	34/6	—	4 1 2
Charing Cross Ordinary	1	7	7	35/6	—	3 19 0
Chelsea	1	7	7	34/6	—	4 1 2
City of London	1	7½	7½	36/3	—	4 2 10
Clyde Valley	1	7	7	41/3	—¼	3 8 0
County of London...	1	10½	10½	57/6	—¼	3 13 0
Edmundson's 7% Pref.	1	7	7	34/-	—	4 2 4
Elec. Dis. Yorkshire	1	9	9	48/9	—	3 13 9
Elec. Supply Corporation ...	1	11	11	76/3	—	2 17 9
Kensington Ordinary	1	7	7	35/-	—	4 0 0
Lancs Light and Power	1	7	7½	38/9	—	3 17 4
London Electric	1	7	7	35/6	—	3 19 0
Metropolitan	1	10	10	52/6	—6d.	3 14 6
Midland Counties	1	7	7	37/6	—	3 14 8
Mid. Elec. Power	1	8	8	41/3	—	3 17 8
North Eastern Electric Ordinary	1	6	6	33/6	—6d.	3 11 7
Do. 7% Pref.	1	7	7	35/-	—	4 0 0
Northampton	1	10	10	56/3	—	3 11 3
Notting Hill 6% Pref.	10	6	6	14½	—	4 2 9
North Met. Elec. Ordinary ...	1	10	10	63/9	—	3 2 10
Do. do. 6% Pref. ...	1	6	6	31/6	—	3 16 2
St. James' and Pall Mall ...	1	7	7½	36/6	—	4 3 4
Scottish Power	1	8	8	2	—	4 0 0
South London	1	7	7	37/-	—	3 15 9
Westminster Ordinary	1	7	7	34/6	—	4 1 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	22/-	—	6 16 4
Yorkshire Elec.	1	8	8	48/9	—9d.	3 5 9

Public Boards.

		1931.	1932.			
Central Electricity, 1950–70 ...	Stock	5	5	116	—	4 6 2
Do. 1955–75 ...	,,	5	5	117	—	4 5 8
Do. 1951–73 ...	,,	4½	4½	111	—	4 1 1
Do. 1963–93 ...	,,	—	3½	97	—	3 10 8
London & Home Counties, 1955–75	,,	4½	4½	110	—	4 1 10
London Passenger Transport, A...	,,	—	4½	119½	+1	3 15 4
Do. do. B...	,,	—	5	123½	+1	4 1 0
Do. do. C...	,,	—	—	78½	—1	—
West Midlands Joint Elec. 1948–68	,,	—	5	114	—	4 7 9

Telegraph and Telephones.

American Tel. & Tel.	$100	9	9	112½	+3	8 0 0
Anglo-Am. Tel. Pref.	Stock	6	6	115	—1	5 4 5
Do. Def.	,,	1½	1½	28	—	5 7 2
Cables & Wireless 5½% Pref. ...	,,	2¾	2¾	74	—	3 14 4
Do. A. 7½% Ord.	,,	Nil	Nil	19	—1¼	—
Do. B. Ord....	,,	Nil	Nil	8½	—½	—
Globe Tel. and T. Ord.	10	Nil	2½	10½	—	2 8 9
Do. do. Pref.	10	6	6	13	+½	4 12 4
Great Northern Tel.	10	20	20	40	+¼	5 0 0
Marconi-Main	1	10	7½	31/3	—	4 16 0
Oriental Telephone Ord.	1	12	12	3½	—	*8 16 10

Home and Foreign Trams, Etc.

Anglo-Arg. Trams First Pref. ...	5	Nil	Nil	2/-	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	5	—	—
British Electric Traction Df. Ord.	,,	5	5	625	—15	—
Do. do. Pref. Ord.	,,	8	8	157½	—	5 1 7
Brazil Traction	100	—	—	10½	—	—
Brit. Columbia Elec. Rly. Pce. ...	Stock	5	5	105	—	4 15 3
Mexico Trams, 5% Bonds ...	—	5	5	24½	—	20 8 0
Mexican Light Common	100	Nil	Nil	8	—	—
Do. 7% Pref.	100	7	7	7½	—	—
Do. 1st Bonds...	—	5	5	49½	—	10 10 6
Victoria Falls Ord.	1	15	20	6⅜	+⅛	3 2 9
Yorkshire (West Riding)... ...	1	2½	5	28/9	+6d.	4 4 0

Manufacturing Companies.

Assoc. Elec. Ord.	1	4	3	18/3	+6d.	3 5 7
Do. Pref.	1	8	8	32/6	—	4 18 6
Babcock & Wilcox	1	9	6	41/3	—	2 18 1
British Aluminium Ord.	1	5	5	30/0	+6d.	3 6 8
British Insulated Ord.	1	15	15	68/9	—	4 7 3
Brush Ord....	Stock	Nil	Nil	35	—	—
Callender's...	1	15	15	3¼	—	5 0 0
Do. 6½% Pref....	1	6½	6½	30/9	—	4 4 6
Crompton Parkinson Ord. ...	5/-	22½	12½	27/-	—	—
Do. 8% Pref.	1	8	8	32/6	—	4 18 6
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	6 2 5
Do. 5% Deb.	Stock	5	5	102½	—	4 17 7
Electric Construction	1	Nil	Nil	13/9	—	—
Enfield Cable Ord.	1	25	20	86/3	—¼	4 13 0
English Electric	1	Nil	Nil	6/3	—	—
Do. do. Pref.	1	Nil	Nil	10/-	—	—
Ever Ready	5/-	35	35	30/-	—	5 16 8
Ferranti Pref.	1	7	7	26/6	—	5 5 9
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	8	8	42/6	—	3 15 1
Henley's	1	30	30	6¼	—	4 19 2
Do. 4½% Pref.	5	4½	4½	5½	—	4 5 9
India-Rubber Preferred	1	—	—	17/6	—	—
Johnson & Phillips	1	5	5	23/3xd.	—	4 6 0
Siemens Ord.	1	6½	4	18/9	—	4 5 4
Telegraph Construction	£1	Nil	Nil	21/3	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings taken.

1932

21445. "Master clocks for actuating electrically driven secondary clocks." E. Brunner and H. Buhler. July 29th, 1932 (Convention date not granted). (409329.)

23236. "Suspension of electric or gas lamps in inaccessible positions." W. Slingsby & Co., Ltd., W. Slingsby and T. Slingsby. August 19th, 1932. (Cognate applications 1489/33 and 1491/33.) (409271.)

24154. "Control of low-pressure gas or vapour-filled electric discharge devices." Akt-Ges. Brown Boveri et Cie. August 27th, 1931. (409331.)

26523. "Industrial, laundry, domestic, and other electric irons." E. C. Malins. September 23rd, 1932. (409303.)

29418. "Switching or control arrangements for use in connection with toy vehicles, mechanical toys, and the like." W. Lines and Lines Bros., Ltd. October 21st, 1932. (409279.)

29493. "Electric ignition systems for internal-combustion engines." E. L. R. Lysholm. October 22nd, 1931. (409335.)

29589. "Insulation of electric cables." W. T. Henley's Telegraph Works Co., Ltd., and H. C. Hoban. October 22nd, 1932. (409280.)

29536. "Automatic switches for use in telephone or like systems." Automatic Electric Co., Ltd. November 16th, 1931. (409284.)

29755. "Control devices for mechanically adjustable tuning apparatus of wireless receivers." H. Fitzpatrick. October 24th, 1932. (409286.)

29797. "Automatic or semi-automatic telephone, or like exchange systems." Standard Telephones & Cables, Ltd., E. P. G. Wright, G. C. Hartley and G. A. Roberts. October 25th, 1932. (409296.)

29815. "Radio direction determining systems." Electrical Research Products Inc. November 19th, 1931. (409298.)

30144. "Electric or gas fires." F. Durrant. October 27th, 1932. (409342.)

30185. "Receiving apparatus for deep-sea telephonic cable systems." Electrical Research Products, Inc. February 3rd, 1932. (409324.)

30316. "Automatic switches for use in telephone or like systems." Automatic Electric Co., Ltd. January 8th, 1932. (409352.)

30334. "Arrangements relating to automatic telephone systems." A. H. Olson and S. D. Vigren. October 28th, 1932. (409356.)

30380. "Bridge duplex telegraph systems." Electrical Research Products, Inc. February 3rd, 1932. (409358.)

30506. "Amplitude distortion compensators for alternating-current signal voltages." L. E. Ryall. October 31st, 1932. (Cognate applications 34722/32 and 3/33.) (409360.)

30530. "Television scanning apparatus." Electrical Research Products, Inc. January 7th, 1932. (409367.)

30582. "Acoustic devices of the electrodynamic type." Electrical Research Products, Inc. April 12th, 1932. (Addition 333578.) (409368.)

30617. "Traffic-control signals." Automatic Electric Co., Ltd., A. P. B. Renshaw and D. Wright. October 31st, 1932. (409376.)

30618. "Automatic switches for use in telephone or like systems." Automatic Electric Co., Ltd. December 14th, 1931. (409377.)

30621. "Variable electric potentiometer devices." British Goldring Products, Ltd. August 11th, 1932. (409379.)

30643. "Electrically driven clamping devices, for example, chucks or the like." W. Wehmeyer. November 5th, 1931. (409382.)

31020. "Electric tumbler switches." General Accessories Co., Ltd., and P. A. Johnson. November 3rd, 1932. (409396.)

31043. "Television transmission systems." Fernseh Akt-Ges. November 5th, 1931. (409400.)

31083. "Portable electric illuminating devices." H. O. Meyer. November 6th, 1933. (409403.)

31169. "Apparatus for interrupting carrier current." General Electric Co., Ltd., and D. W. Berry. November 4th, 1932. (409405.)

31279. "Coupling devices more particularly intended for motor-operated electric switches." H. Nutt. November 5th, 1932. (409407.)

31367. "Electrical discharge devices for production of luminous effects." P. Freedman. November 7th, 1932. (409410.)

31707. "Loudspeakers for wireless and gramophone apparatus." B. Freeman. November 10th, 1932. (409415.)

31758. "Water-level regulation in hydro-electric works." A. A. Ahmed. November 10th, 1932. (409416.)

31947. "Electric terminal devices or/and cord grips or cord exit devices, such as ceiling-roses." General Electric Co., Ltd., and W. M. H. Butcher. November 11th, 1932. (409420.)

32294. "Electric condensers." Allmänna Svenska Elektriska Aktiebolaget. November 19th, 1931. (409425.)

32673. "Interlinked electric switches for wireless receivers." W. M. Sherman. November 18th, 1932. (409429.)

32888. "Electrical transformers." D. R. Davies and Associated Electrical Industries, Ltd. November 21st, 1932. (409430.)

33455. "Loudspeakers." H. Brzeski. November 25th, 1932. (409433.)

34439. "Field windings for dynamo-electric machines." British Thomson-Houston Co., Ltd. December 5th, 1931. (409435.)

34524. "Electrical heat storage systems." A. G. Brown and I. C. Morgan. December 6th, 1932. (409436.)

35524. "Method of, and arrangement for, producing high-emission thermionic cathodes." Dr. S. Loewe. December 16th, 1931. (409443.)

1933

759. "Radio and the like signal reception." Radio Research Laboratories, Inc. April 14th, 1932. (Cognate application No. 760/33.) (409460.)

764. "Circuits including electric discharge devices." Radio Research Laboratories, Inc. June 15th, 1932. (409461.)

1473. "Excitation of alternating current dynamo-electric machines." Siemens-Schuckertwerke Akt.-Ges. January 15th, 1932. (409466.)

2586. "Electrically heated gas lighters." Ever Ready Co. (Great Britain), Ltd., and A. H. Sheppard. January 26th, 1933. (409470.)

2774. "Alternating-current commutator motors." Crompton Parkinson, Ltd., and C. W. Major. January 28th, 1933. (409471)

2982. "Electrical systems of remote control and supervision." General Electric Co., Ltd., and N. C. Smart. January 31st, 1933. (409472.)

3368. "Wall plugs and hook sockets." C. R. Hall. February 3rd, 1933. (409474.)

3603. "X-ray installations." C. H. F. Muller Akt.-Ges. February 8th, 1932. (409476.)

4963. "Electric motors." Wallace and Tiernan Products, Inc. March 1st, 1932. (409481.)

6448. "Control gear for a.c. commutator motors." F. Wood and G. V. Sadler. March 3rd, 1933. (409485.)

6900. "Control systems for electric elevators." Igranic Electric Co., Ltd. (E. U. Lassen). March 7th, 1933. (Convention date not granted.) (409487.)

6935. "Production of ultra-violet and luminous radiations by electric discharge apparatus." Soc. Anon. pour les Applications de l'Electricité et des Gaz Rares Etablissements Claude Paz and Silva. January 9th, 1933. (Addition to 404271.) (409488.)

8046. "Devices for securing electrical plants against faults in insulation." A. M. Hasley. March 16th, 1933. (409495.)

10168. "Electromagnetic gears." W. F. Cleaver. April 5th, 1933. (409501.)

13365. "Electric retractive switches with delayed return." International General Electric Co., Inc. May 7th, 1932. (Addition to 36479/32.) (409510.)

16779. "Process of preparing purified lubricating and electrical resistance oil from use or waste oils." C. Van Grondelle. June 12th, 1933. (409522.)

18741. "Plug-and-socket connectors for electric circuits." C. L. Arnold and M. K. Electric, Ltd. July 1st, 1933. (Addition to 364797.) (409529.)

20539. "Quick make-and-break ceiling-switch." F. L. Cook. August 16th, 1932. (409536.)

22588. "Wire-wound grids for electron-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. November 17th, 1932. (409546.)

23583/4/5. "Reversing signalling and/or road illuminating lamps for motor vehicles." C. J. Evans. August 1st, 1933, December 29th, 1932, and March 23rd, 1933. (Divided application on 6559/32.) (409556/7/8.)

23987. "Low-voltage electric cells for medical use." E. J. Horak. April 8th, 1933. (409561.)

24133. "Electrically-driven vacuum cleaners." P. Pfeiffer, W. Mauz, E. Faber, and L. Hahn (trading as Mauz and Pfeiffer). September 24th, 1932. (409563.)

24725. "Valve-controlled electric motors." British Thomson-Houston Co., Ltd. September 6th, 1932. (409565.)

25903. "Circuit arrangements including a number of thermionic valves having equipotential cathodes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. January 19th, 1933. (409574.)

27602. "Discharge tubes with indirectly-heated cathodes." Elektrische Gluklampen-Fabriken J. Kremenesky Akt.-Ges. October 8th, 1932. (409583.)

28143. "Quick-action electric switches." R. Bosch Akt.-Ges. November 3rd, 1932. (409587.)

28970. "Electric discharge vessels." C. H. F. Muller Akt.-Ges. November 2nd, 1932. (409586.)

31136. "Circuit-closing arrangement for the killing of whales by electricity." Aktieselskapet Elektrisk Hvalskytning. Nov-December 2nd, 1932. (409606.)

32643. "Electron-discharge tubes and incandescent electric lamps." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. March 22nd, 1933. (409613.)

33406. "Domestic electric kettles." J. Anderson. November 29th, 1933. (409614.)

34012. "Electrical connectors." Igranic Electric Co., Ltd. December 2nd, 1932. (409619.)

35095. "Fans." British Thomson-Houston Co., Ltd. December 20th, 1932. (409626.)

35128. "High-frequency signalling systems." Soc. Francaise Radio-Electrique. December 27th, 1932. (409628.)

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10256. "Quick-make-and-break electric switches." F. L. Cook. November 16th, 1932. (Divided application on 26603/33.) (409645.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from May 16th :—

Metrovac. No. 548857. All goods in Class 8.—Metropolitan-Vickers Electrical Co., Ltd., Bush House, Aldwych, W.C.2.

Penetrode. No. 547966. Class 13. Welding electrodes of ordinary metal.—John F. Wood & Co., Railway Mills, John Street, Darlington.

Turnall. No. 549495. Class 50. Electrical insulating materials, &c., all made principally of asbestos.—Turner & Newall, Ltd., Woodland Road, Spotland, Rochdale, Lancs.

Decora. No. 550187. Class 50. Mouldable powders made from synthetic resin or casein or articles moulded therefrom or from similar materials.—Universal Metal Products, Ltd Langley Street, Pendleton, Manchester.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Accrington.—Houses (30), Laneside Estate; borough engineer.

Bedford.—Houses (100), Elstow Road Estate; A. E. Craig & Co., Ltd. Cinema, St. Peter's Street; Benslyn, Morrison & Jordan. Factory, Kathie Place; E. H. C. Inskip & Sons.

Bedfordshire.—Mental institution, Broham House, Bedford (£110,000); Bedfordshire & Northamptonshire Joint Board.

Bexley.—Maternity home, Burstead Wood; U.D.C. surveyor.

Birmingham.—Cinema, Kingstanding Road, Erdington; H. Robinson, architect, 6, Cherry Street. Factories for Bakelite, Ltd., King's Road, Tyseley (£20,000), and for Dryenamels, Ltd., Shaftmoor Lane, Acocks Green (£25,000); Whittalls & Sons, builders, Lancaster Street.

Bromsgrove.—Estate development, Charford Lane; C. F. Cooper & Sons, Ltd., Warley.

Burnbank.—Houses (52); Offices, Municipal Chambers, Hamilton.

Cambridge.—Reinstatement of Sawston Mills, for Pulp Industries, Ltd. (£10,000); H. G. Spicer, managing director. Nurses' home, Mill Road Infirmary, Cambridge, for C.C.; S. E. Urwin, acting county architect, Castle Hill, Cambridge.

Campbeltown.—Houses (46); Neil Ferguson, burgh surveyor, High Street.

Cannock (STAFFS).—Extensions to Staffordshire Mining College (£10,000) with electrical work; J. & B. Wootton, builders, Pinfield.

Chipping Norton.—Cinema, New Street, for Sydney Hall, Benge Hill, Evesham.

Colchester.—Post office, Head Street, for H.M. Office of Works, King Charles Street, London, S.W.

Cumnock (AYRSHIRE).—Houses (59); R. Forkes, burgh surveyor, Town Hall.

Darlington.—Alterations and additions to Municipal Institution, Yarm Road; E. Minors, borough engineer.

Dartford.—Houses (15), Mount Pleasant Road; W. G. Cooper. Houses (45), Oakfield Park Road; Reliance Construction Co., Ltd. Houses (21), Princes Road; G. H. Giles. Seven shops, Lowfield Road; J. W. Ellingham, Ltd. Stores, workshop and offices, Millpond Road; R. Firman.

Douglas (I.o.M.).—Houses (24), Bray Hill; W. E. Thompson.

Dumbartonshire.—School, Bearsden (£7,195); County clerk, Dumbarton.

Edinburgh.—Houses (22), Priestfield Road; J. Miller, builder.

Esher.—Houses (30), Esher, Cobham and Claygate; H. C. Fread, R.D.C. surveyor.

Evesham (WORCESTERSHIRE).—Elementary School for Senior Girls (£20,000) with electrical work; A. V. Priestley, director of education.

Finedon.—Houses (28), Thrapston Road; W. George, 167, Silver Street, Wellingborough.

Galston.—Houses (32); burgh surveyor.

Gloucester.—Methodist Church, Coney Hill; W. Jones, builder, Kingsholm.

Guisborough (YORKS).—Houses (26), Hedley Street, for W. Oliver.

Halesowen.—Houses (30), Hawne Lane; G. Spurr, U.D.C. surveyor. Methodist Church; S. T. Beach, architect, Birmingham Road.

Halifax.—Houses (23); G. R. Oddy, architect, Ward's End Chambers.

Halstead (ESSEX).—Houses (20); U.D.C. surveyor.

Huddersfield.—Houses (124), Cross Lane, Newsome; borough engineer, 1, Peel Street.

Hull.—Departments to Ainthorpe Grove School, and telephone exchange, Kirkella; city architect.

Inverness.—School, Dunvegan, Isle of Skye, for C.C.; R. Robertson, county architect, 26, Bank Street, Inverness.

Irvine.—Houses (100), Springbank; John Adam & Co., builders, Glasgow.

Kent.—Buildings, mental colony, Leybourne (£72,850); county architect, Maidstone.

Kilmarnock.—Maternity Home (£20,000); burgh surveyor.

Kirkcaldy.—Fire station, &c. (£9,000); burgh surveyor.

Kirkham (LANCS).—Houses, Station Road and Barnfields; U.D.C. surveyor.

Leadgate.—Houses (14); T. M. Ripley, U.D.C. surveyor.

Leeds.—Estate development, Bramley; J. W. Watson & Sons. Estate development, Dewsbury Road; Thomas H. Mawson & Son.

Leith.—Houses (26) for Bangholm Building Co., Ltd., 42, Cassel's Place.

Lichfield.—Houses (28); R. T. Rix & Son, builders, Shenstone Wood End.

Littlehampton.—Alterations, 53, Pier Road; Percival Cooper, Ltd.

Liverpool.—Extensions to Sun Insurance Building, Chapel Street; E. J. Dod, architect, Cunard Buildings.

London.—(CHELSEA).—Nine-storey block of flats, Turk's Row; G. Vernon, 19, Russell Square, W.C.1. (KENTISH TOWN).—Alterations to St. Margaret's Hospital (£2,980); L.C.C. architect. (LEWISHAM).—Elementary school, Cooper's Lane (£31,123); L.C.C. architect. (ST. PANCRAS).—Buildings, for Waite & Waite, 179, Tottenham Court Road; F. Rings. (WESTMINSTER).—Buildings, Chesham Place; Messrs. Joseph, architects. Buildings, 41, Greencoat Place; G. A. Hall. (WHITECHAPEL).—Extensions to St. Peter's Hospital (£1,735), for L.C.C.

Manchester.—Development of Royalthorn Estate, Wythenshawe; Bolver & Co. School, Heverleyhey; city architect.

Market Drayton.—Houses (28); T. Healey, builder.

Middlesex.—Senior school, Feltham (£30,400); W. Moss & Sons, Ltd., builders, Cricklewood.

Milngavie.—Houses (224); F. A. B. Preston, housing architect, Buchanan Street.

Motherwell.—Works, Range Road (£7,000), for Motherwell Brick Co., Ltd., 29, St. Vincent Place, Glasgow.

Musselburgh.—Block of houses; J. Logan, burgh surveyor, Municipal Buildings.

Nelson (LANCS).—Houses (35), by direct labour; borough surveyor.

Newburn-on-Tyne.—Houses (26), South Denton Estate; R. Bainbridge, builder, Newcastle-on-Tyne.

Newcastle-on-Tyne.—Extensions to premises of Greenfield & Co., 11, Carliol Street; Lough Bros., builders, Higham Place.

Northamptonshire.—Elementary school, Corby, for County E.C. Nurses' home, Berry Wood Hospital (£29,675); county engineer.

Northolt.—Houses (32), Whitton Avenue; Hillingdon Estate Co.

North Riding.—Alterations to Lady Lumley Grammar School (£3,000); Richmond Grammar School (£3,200); and Yarm Grammar School (£2,100), for County E.C.; J. R. White, county architect, County Hall, Northallerton.

Norwich.—Houses (50), Coach and Horses area; city engineer.

Peebles.—Reconstruction of Kingsland House (£20,000); Offices, Council Room, Edinburgh.

Portland.—Houses (16), Avalanche Road; U.D.C. surveyor. Cinema, Victoria Square, for G. K. Spivey, of Weymouth; S. Tewson.

Preston.—Maternity hospital, &c., Royal Infirmary (£40,000); A. C. M. Lillie, architect, Bamber Bridge.

Ramsgate.—Wireless relay station, Westwood; E. W. Martin, builder, 4, Victoria Road.

Redcar.—Houses (26), Dormanstown; borough surveyor.

Rochdale.—Dance Hall, with electrical work, Drake Street; W. Cryer, builders, Beresford Street, Milnrow.

Rotherham.—Cinema, Corporation Street, for T. Wade & Sons, Ltd., Wath; Blackmore & Sykes, architects, Hull.

Rothesay.—Extension to housing scheme for T.C.; Alex Stephen, burgh surveyor, High Street, Rothesay.

Rugeley (STAFFS).—Houses (50), Green Lane; U.D.C. surveyor.

St. Albans.—Houses (54); E. S. Moss, Ltd., builders, Cricklewood.

St. Ives (HUNTS).—Houses (100); R.D.C. surveyor.

Saltcoats.—Houses (150); G. Harley, burgh surveyor, Kyleshill.

Scarborough.—Houses (110), Prospect Mount Estate; T. P. Watson, borough engineer.

Sedgley.—Houses (25), Dibdale Road; Russells.

Sheffield.—Houses, Batley Street and Cannon Hall Road; G. A. Alflat.

Shrewsbury.—Houses (40), New Park Road; borough surveyor.

Somerset.—Electrical installation, Weston-super-Mare school, for County E.C.; A. J. Toomer, county architect, Park Street, Taunton.

Spalding.—Shops, arcade, and offices, Broad Street, for G. Elsom.

Stoke-on-Trent.—Houses (20), Birks Street; J. Hawthorne.

Stockport.—Extensions to premises of Preston & Sons, High Street; Briggs & Co., builders, Heaton Norris.

Stourbridge.—Senior school, Pedmore Road; A. V. Rowe, architect.

Stourport.—Extensions to Lucy Baldwin Hospital; Sir Julien Cahn.

Swansea.—Rebuilding, 271, Oxford Street; Marks & Spencer, Ltd.

Tweedmouth (NORTHUMBERLAND).—R.C. school (£5,000); W. Whitley, builder, Berwick.

Wakefield.—Restaurant, Kirkgate, for C. Hagenbach & Sons, Ltd., Northgate.

Wallingford.—Houses (11), Goldsmith's Lane; F. R. Hedges, town clerk.

Wanstead.—Works extensions, Fullers Road; Atlas Works Co.

Warwickshire.—Extensions, with electrical work, Warwick Institution (£6,135), for the P.A.C.; J. I. Fitter, builder, Birmingham.

Wellington (SALOP).—Houses (50), Slang Lane; U.D.C. surveyor.

West Calder.—Houses (200), Parkhead Cottages, and 60 houses at Addiewell; W. Scott, county architect, Council Rooms, Edinburgh.

West Lothian.—Laundry and electric motor, St. Michael's Home, Linlithgow; Offices, Council Buildings, Linlithgow.

Weston-super-Mare.—Cinema, the Centre, for Odeon Theatres, Ltd. (£50,000); T. C. Howitt, architect, Nottingham.

Wigan.—Houses (20), for W. Finch, Wrightington.

Wilton.—Houses (24); borough surveyor.

Wiltshire.—School (320 places), Stratton St. Margaret, for County E.C.; K. Struckmeyer, director of education, Trowbridge.

Wolverhampton.—Houses (246), Elston Hall Estate; A. J. Fieldhouse. Houses (60), New Penn Estate; A. M. Griffiths & Son, Ltd. Houses (102), Three Tuns Lane, Oxley; Wm. Sharratt. Works extensions, Cousins Street; H. Willcock & Co., Ltd. Reconstruction of 22-4, Dudley Road, Wolverhampton; J. V. Boswell & Co.

Woodford.—Works extensions, Roding Lane; Eastern Carriage Works.

York.—Houses (176) and flats, Huntington Road Estate; F. W. Spurr, city engineer.

ARTICLES WANTED.—*Continued.*

D.C. MOTORS, 230 or 460 volt, five 1 h.p., two 1½ h.p., two ½ h.p. About 1,420 r.p.m. Small frames. Same make.—441, Electrical Review, Dorset House, Stamford Street, London, S.E.1.

ROTARY Converter, 500 kW, 525 volt, with switchboard starter equipment and transformer, 1,100 volt, 50 cycle supply and E.H.T. switchgear.—444, Electrical Review, Dorset House, Stamford Street, London, S.E.1.

WANTED, a 100 or 125 kVA 3-phase 415 Volt 50 Cycle single bearing alternator for engine speed 500 r.p.m., alternatively a three-bearing alternator for rope or belt drive from engine. Must be in first class electrical and mechanical condition.—446, Electrical Review, Dorset House, Stamford Street, London, S.E.1.

WANTED, Starter for 15 h.p. Brook Slip Ring Motor, 200 V, 1 phase, 50 p.—Birks, Gerrards Cross. 8074

150 KVA Steam Generating Set, 400/440 volts, three-phase, 50 cycles. State full particulars.—H. C. Woollis-croft & Co., Burnet Street, Liverpool. 8057

AGENCIES.

Advertisements are inserted under this heading at 1s. 9d. per line.

ESTABLISHED Manufacturers, comprehensive range good class domestic appliances, reorganising distribution, offer Sole Agencies to those with established connections.—8034, Electrical Review, Dorset House, Stamford Street, London, S.E.1.

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Advertisements are inserted under this heading at 1s. 9d. per line.

FOR Disposal.—Radio components factory, situated in Ponders End district; fully equipped machinery and plant for all purposes; modern premises. Lease 13 years unexpired at £276 per annum. Stock., etc., at valuation.—Write A.160, National Publicity Co., 43, Shoe Lane, London, E.C.4. 439

BUSINESSES FOR SALE & WANTED.—*Cont.*

FOR Immediate Disposal, Electrical, Wireless and Accumulator Charging Business on N. Wales coast. Books open for inspection. No agents.—Apply, in first instance, 8086, Electrical Review, Dorset House, Stamford Street, London, S.E.1.

S.W. England.—Electrical and Radio Business for sale. Main street. Market town. Turnover approx. £3,500.—8063, Electrical Review, Dorset House, Stamford Street, London, S.E.1

SURREY.—Established Electrical Contractors and Wireless. Going concern. Large premises. Living accommodation if required. Turnover approx. £4,000.—389, Electrical Review, Dorset House, Stamford Street, London, S.E.1.

PARTNERSHIPS.

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CHARTERED Electrical Engineer seeks a directorship or partnership where wide knowledge of high voltage distribution and apparatus can be used to advantage. Capital about £4,000.—8037, Electrical Review, Dorset House, Stamford Street, London, S.E.1.

PARTNER wanted small Electrical Contractor Business, half share £75.—D., 25, Ivy Road, N.W.2. 8075

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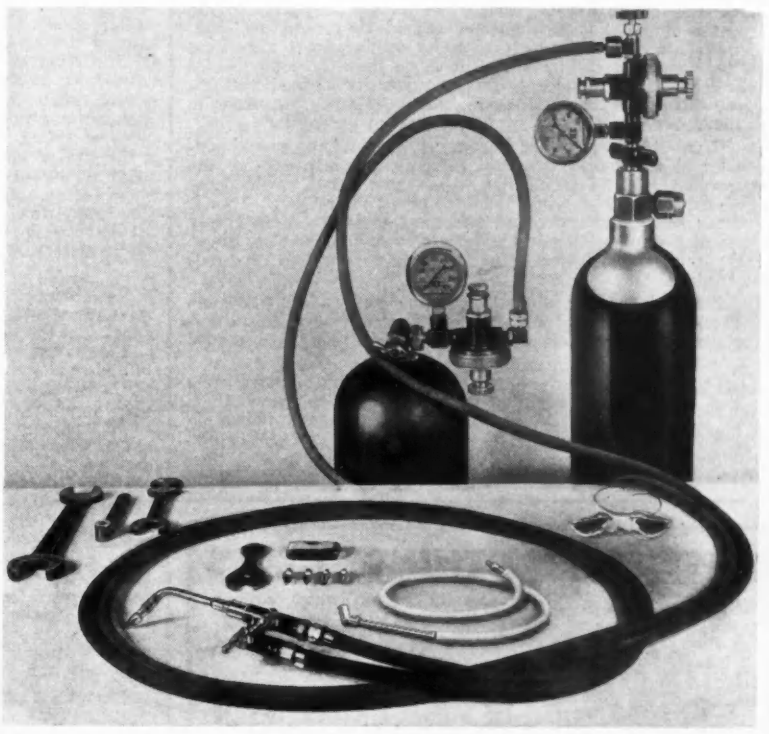
THE B.O.C. MODEL 'O' blowpipe illustrated is a small handy tool with a separate control cock on each gas inlet. The blowpipe is supplied complete with five tips and a spanner. The complete outfit for use with this blowpipe consists of the blowpipe, oxygen and acetylene regulators; 2-10 ft. lengths of tubing; set of spanners and pair of spectacles; also an extension piece which enables the operator to avoid the cumbersome drag upon his arm of the lengths of rubber tubing to the gas cylinders. With the blowpipe strapped to his chest, he has a 2½ ft. rubber hose connection between the blowpipe and the tip adaptor at the operating end of the extension piece.

The complete outfit costs **£8 0s. 6d.** or **£9 18s. 0d.** if supplied in a light metal carrying case.

In addition to a wide sphere of usefulness for light welding both in manufacture and repair work, the Model 'O' blowpipe is a most serviceable blowpipe for almost every class of leadburning.



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'ALDA' MODEL 'O'
WELDING OUTFIT

PRICE: **£8 0s. 6d.**
complete as in illustration above

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THE BRITISH OXYGEN CO. LTD.
ANGEL ROAD, EDMONTON, LONDON, N.18
BRANCHES IN ALL THE CHIEF INDUSTRIAL CENTRES

COMPANY MEETING.

BRUSH ELECTRICAL ENGINEERING.

Strong Liquid Resources.

MR. F. R. DAVENPORT'S SPEECH.

THE 45th general meeting of the Brush Electrical Engineering Co., Ltd., was held on Thursday, 17th May, at the Holborn Restaurant, London, W.C.

Mr. F. R. Davenport (the chairman) said that the directors regretted that they had again to present a balance sheet showing a loss—the amount being £85,681, which, after deducting £2,711 profit on sale of investments during the year, left a net deficit of £82,970. That had been written off the general reserve, which now stood at £70,559. Adding to that the undivided profits account of £54,940, they got a total reserve of £125,499. The liquid resources of the company were still strong, being represented by cash, £25,880; first-class securities amounting at cost to £100,633; and excess of debtors over creditors of £20,437. Their stores and work in progress stood at £169,640. He mentioned those facts not to evade the seriousness of the year's loss, but because they showed that the company was well placed to take advantage of any improvement in trading conditions and to carry through any new developments of a suitable character.

The heavy loss on trading was due to shortage of work and to very low prices ruling for the orders obtained, home and overseas. That was true in all departments. In the rolling stock department both those conditions existed, the one from very serious contraction of the orders placed by transport concerns and the other due to the absurd lengths to which competition between manufacturers had been carried in the endeavour to secure a share of the business offering. The engineering side of their business had suffered equally from a reduced demand and appallingly low prices.

During the past year they had commenced the manufacture of oil engines and homogenisers. The Brush oil engine was already an outstanding model, and the engines put into service had received the highest praise from many experts. They had a promising order book.

EXCESS PRODUCTIVE CAPACITY.

In conclusion, the chairman said: Reference has recently been made by the chairmen of companies engaged in very similar work to ourselves to the excess of productive capacity we now all suffer from. This has led in some quarters to price cutting that can only be termed insane and which does no one any good. The National Grid System naturally and seriously reduces the quantity of power plants required, and this, coinciding largely with the world depression of these last few years, has hit certain companies very severely. It seems to me that consideration should be given, and soon, to this condition of excessive capacity with a view to stabilising this branch of the industry. It is an industry composed of skilled men, whether engineers, designers or manual workers, and surely, as such, deserves, and should be organised to yield, fair prices and a reasonable return on capital.

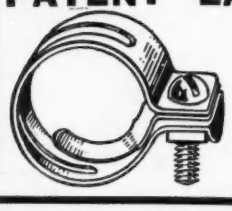
If we are too large for the present demand we should consider closer co-operation and merging our interests for the common good. I should like to say now that we will gladly confer with those concerned in any such direction. This is being seen in many other directions to-day. I need only mention ship building and textiles to remind you of this, and in the raw material world tin, tea, and now rubber, are outstanding cases.

It may be said in general terms that the leading customers of our industry, say, purveyors of electrical power and owners of road transport concerns, secure a good living and a good return on the capital entrusted to them.

Logically, it would be only fair that those manufacturers who are the complement of those industries and assist them to attain that position should also receive a fair return on their labour and be able to earn a fair yield on the capital entrusted to them.

The report and accounts were unanimously adopted. 412

PATENT EARTHING CLIPS



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All sizes from ½" to 2".

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COMPANY MEETING.

THE BRITISH POWER & LIGHT CORPORATION (1929), LTD.

THE Fifth Ordinary General Meeting of the above company was held on Thursday, May 17th, 1934, at Winchester House, Old Broad Street, London, E.C.

Mr. C. E. BENSON, D.S.O., presided.

The CHAIRMAN said:—Before commenting on some of the figures it is with deep regret that I must refer to the death of our late chairman, Mr. H. A. Vernet. Mr. Vernet had been chairman of the corporation since its inception in 1929, and his great ability, his wise leadership, and his untiring energy make his loss one which the corporation will feel indeed keenly. Not only, however, have we lost an invaluable chairman, but, for many of us of the British Power and Light, and in this room to-day, a trusted and personal friend.

THE AVAILABLE BALANCE.

The balance available, before the preference dividend, is £67,551 as against practically the same figure, £67,432, last year. After providing for the preference dividend, the earnings available for the ordinary shares amount to £40,551, against £46,092 last year, and are equivalent to 3,265 per cent., less tax, on the ordinary shares, against just under 4 per cent. last year. You will see, however, that the consolidated earnings of the corporation are almost the same as for last year, being £47,168 as against £46,177.

The net decrease in earnings available is accounted for by two factors—first, and to a minor degree, by the preference dividend which has been paid this year for a full year as against a broken period last year; and, secondly, to the largely decreased dividend which we have received from the North Wales Power Company.

The sales of the North Wales Power Company continue to make progress, in particular the sales to authorised undertakers—that is to say, municipalities, &c.—and to miscellaneous power consumers have shown a satisfactory expansion. I am glad to be able to report too that our supplies of energy to the quarries of all sorts show a considerable increase this year, as against a substantial decrease last year. Despite, however, the increases from all sources, as reflected by an increase of some £22,000 in this company's gross revenue, it has been found necessary to reduce the North Wales Power dividend from 3½ per cent. to 2 per cent. Two causes are responsible for this—namely, rates and the drought.

BURDEN OF RATES.

Last year, you will remember, our late chairman explained to you the anomalies that appeared to exist in the rating laws as they applied to hydro-electric stations as against steam-generating stations. Electrical undertakings are assessed for rates on their net profit-earning capacity. But the capital cost of a hydro-electric station per kW of capacity is much higher than the cost of a coal station, due to the substantial capital expended in connection with the storage of water. In determining the rateable value of the undertaking this difference in the capital cost is not taken into account.

In order to obtain some fair measure of relief the directors of the North Wales Power Company were advised that Parliamentary action would be necessary if any alteration in the basis of rating assessment was to be obtained. Accordingly a Bill was promoted by that company, which included, among other clauses, one dealing with the rating question. This Bill came before a Committee of the House of Lords last month. The Committee, after a lengthy hearing, accepted in principle all the clauses of the Bill with the exception of the rating clause, which was rejected.

EFFECTS OF THE DROUGHT.

The second cause which, as I have already mentioned, seriously affected the earnings of the North Wales Power Company, was the unprecedented drought which obtained throughout last year, and as a consequence it was necessary for the company to purchase from outside sources a very large quantity of energy to meet the demand of its consumers. In 1932 the cost of energy purchased from outside sources was £10,285. In 1933 this figure rose to £35,973.

The Electricity Distribution of North Wales and District continues to make good progress, the number of consumers connected increasing by 22 per cent. during the year, and the sales of units by 27 per cent.

The English Distribution Companies are expanding in a satisfactory manner. This group of smaller companies has been steadily developing each year and has now reached a point where, as a whole, they have reached a profit-earning basis, after interest on our advances to them, and after charging full depreciation from the inception of each company. I am hopeful that they will in the future be a not unimportant factor in contributing an increasing revenue to the corporation.

THE OUTLOOK.

As to the future, the first three months of 1934 continue to show progress in the subsidiary companies, despite the present shortage of water which still obtains in North Wales. The progress of the corporation is slow, but nevertheless it is steadily increasing in terms of gross earnings, and, if factors over which we have unfortunately no control, such as the drought, will be a little kinder to us in the future than they have been in the past, I am confident that such increases in gross will be reflected in the net figures available for distribution.

Before concluding I would like to put on record the directors' appreciation of the work which has been done throughout the year by the staff of your company and also by the staffs of all the subsidiary companies.

The report and accounts were unanimously adopted. 417